SHELL OFFSHORE INC.

BEAUFORT SEA
REGIONAL EXPLORATION
OIL DISCHARGE PREVENTION
AND
CONTINGENCY PLAN

SHELL OFFSHORE INC.

ANCHORAGE, ALASKA

MMS COMPLETENESS FINAL SUBMITTAL

JANUARY 2007

MANAGEMENT APPROVAL AND MANPOWER AUTHORIZATION

OIL DISCHARGE PREVENTION AND CONTINGENCY PLAN
BEAUFORT SEA EXPLORATION
NORTH SLOPE, ALASKA

This Oil Discharge Prevention and Contingency Plan (C-Plan) has been prepared for offshore exploration activities in the Beaufort Sea, Alaska, conducted by Shell Offshore Inc.

This plan is approved for implementation as herein described. Manpower, equipment, and materials necessary for oil discharge prevention and response will be provided as required in accordance with this plan.

11-20-06

Rick Fox
Asset Manager, Alaska Operations
Shell Offshore, Inc.

Date

11/20/06

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RECORD OF REVISIONS

REVISION NUMBER	REVISION DATE	DATE ENTERED	SUMMARY OF REVISION

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OIL POLLUTION ACT OF 1990 (OPA 90)

U.S. MINERALS MANAGEMENT SERVICE

U.S. COAST GUARD

U.S. MINERALS MANAGEMENT SERVICE

BEAUFORT SEA DEVELOPMENT AREA
OIL DISCHARGE PREVENTION AND CONTINGENCY PLAN

CROSS REFERENCE TO
U.S. MINERALS MANAGEMENT SERVICE RESPONSE PLAN REQUIREMENTS
[30 CFR 254, SUBPART B]

REGULATION SECTION (30 CFR)	SECTION TITLE	PLAN SECTION
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(a)	Identification of Facility, Including Location and Type	Introduction and Section 3.1
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(c)	Record of Changes	OPA 90 Addendum
(d)	Cross-Reference Table	This section
254.23	Emergency Response Action Plan	Section 1.0
(a)	Designation of Trained Qualified Individual (with full authority to implement removal actions and notify federal officials and response personnel)	Sections 1.2 and 3.3
(b)	Designation of Trained Spill Management Team Available 24 hours (including organizational structure and responsibilities and authorities of team members)	Sections 1.2 and 3.3
(c)	Description of Spill Response Operating Team, Including Numbers and Types of Personnel (trained and available on 24-hour basis)	Figure 1-1, Table 1-4, Sections 1.1 and 3.1
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(e)	List of Types of Oil Handled, Stored or Transported	Introduction and Appendix F
(f)	Procedures for Early Detection of a Spill	Sections 2.1 and 2.5
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(g)(1)(i)	Contact Information for Qualified Individual, Spill Response Coordinator and Alternates, and Other Spill Response Management Team Members	Section 1.2.1
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(g)(2)	Methods to Monitor and Predict Spill Movement	Sections 1.6.4 and 1.6.13
(g)(3)	Methods to Identify and Prioritize Sensitive Areas	Sections 1.6.5, 3.2 and Appendix E
254.23 (g)(4)	Methods to Protect Sensitive Areas	Sections 1.6.5, 1.6.11, 1.6.12 and Appendix D
(g)(5)	Methods to Mobilize and Deploy Equipment and Personnel	Sections 1.5 and 1.6.13
(g)(6)	Methods for Storage of Recovered Oil (to allow containment and recovery to continue without interruption)	Sections 1.6.9, 1.6.10, 1.6.13, and Appendix C
(g)(7)	Procedures to Remove Oil and Oiled Debris from Shallow Areas and Along Shorelines and to Rehabilitate Oiled Waterfowl	Sections 1.6.12 and 1.6.13, Appendix E
(g)(8)	Storage, Transfer, and Disposal Procedures	Sections 1.6.9, 1.6.10, and Appendix E
(g)(9)	Methods to Implement Dispersant Use Plan and In situ Burning Plan	Sections 1.7 and 3.7

BEAUFORT SEA DEVELOPMENT AREA
OIL DISCHARGE PREVENTION AND CONTINGENCY PLAN

CROSS REFERENCE TO
U.S. MINERALS MANAGEMENT SERVICE RESPONSE PLAN REQUIREMENTS
[30 CFR 254, SUBPART B]
(CONTINUED)

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254.24	Equipment Inventory	Section 3.6
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(b)	Procedures for Inspecting and Maintaining Spill Response Equipment (inspected monthly; records of inspections and maintenance kept for at least 2 years)	Section 3.6.2
254.25	Contractual Agreements (copies of contracts or membership agreements or certification that they are in effect; must ensure 24 hour availability)	Section 3.8
254.26	Worst Case Discharge Scenario	Section 1.6.13
(a)	Volume and Assumptions/Calculations	Section 1.6.13
(b)	Trajectory Analysis (including maximum extent of oil travel)	Sections 1.6.13 and 3.2
(c)	List of Sensitive Areas That Could Be Affected (from C-Plan) and Strategies for Protecting Them	Sections 1.6.13, 3.10 and Appendix E
(d)	Response to Worst Case Scenario in Adverse Weather Conditions	Sections 1.6.13 and 3.4.1
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(a)	Inventory and Location of Dispersants and Other Spill Response Chemicals	Not Applicable
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CROSS REFERENCE TO
U.S. MINERALS MANAGEMENT SERVICE RESPONSE PLAN REQUIREMENTS
[30 CFR 254, SUBPART B]
(CONTINUED)

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254.28	In situ Burning Plan Appendix	Sections 1.7 and 3.7
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(b)	In situ Burning Procedures, Including Ignition	Section 1.7
(c)	Environmental Effects of Burn	Section 1.7
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(e)	Circumstances When Burning is Appropriate	Section 1.7
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(b)	Exercise Plans (for Annual Spill Management Team Tabletop, Annual Deployment of Equipment Staged Onshore, Annual Notification Exercise, Semiannual deployment for Equipment and Facility) (entire plan must be exercised once every 3 years); (National Preparedness for Response Exercise Program [PREP] can be used)	Sections 2.1 and 3.9

WORST CASE DISCHARGE VOLUME

ELEMENT	CAPACITY (BBL)	REFERENCE
Sum of Capacity of Oil Storage Tanks	594,274	Table 1-15
Daily Production Volume of Highest Capacity Well	5,500	18 AAC 75.434(b)
Total Worst Case Discharge (WCD)	165,000	Section 1.6.13

U.S. COAST GUARD

BEAUFORT SEA DEVELOPMENT AREA
OIL DISCHARGE PREVENTION AND CONTINGENCY PLAN

CROSS REFERENCE TO U.S. COAST GUARD AND DEPARTMENT OF HOMELAND SECURITY RESPONSE PLANS FOR OIL FACILITIES TRANSFERRING OIL OR HAZARDOUS MATERIAL IN BULK [33 CFR 154]

REGULATION SECTION (33 CFR 154)	SECTION TITLE	PLAN SECTION
1035(a)	Introduction, Plan Contents, and Cross Index	OPA 90 Addendum, Introduction
(a)(1)	Facility name, address, telephone and fax numbers, mailing address	Introduction
(a)(2)	Facility's geographic location	Introduction, Figure I-1, and Section 3.1
(a)(3)	24-hour procedure for contacting facility owner	OPA 90 Addendum, Sections 1.1, and 1.2
(a)(4)	Table of contents	Table of Contents
(a)(5)	Cross index	This document
(a)(6)	Record of changes	Record of Revisions
(b)	Emergency Response Action Plan	Section 1
(b)(1)	Notification procedures	Sections 1.1, 1.2, and 3.3
(b)(1)(i)(A)	List of response personnel (include Qualified Individual)	OPA 90 Addendum, Sections 1.1, 1.2 and 3.3
(b)(1)(i)(B)	Government agencies	Section 1.2.3, Tables 1-2, 1-3, and 1-4
(b)(1)(ii)	Notification form	Figure 1-2
(b)(2)(i)(A)	Average most probable discharge	Page USCG-3
(b)(2)(i)(B)	Maximum most probable discharge	Page USCG-3
(b)(2)(i)(C)	Worst case discharge	Page USCG-3
(b)(2)(i)(D)	Worst case discharge from non-MTR portion	Not applicable
(b)(2)(ii)(A)	Failure of manifold, loading arm, hoses, other	Section 1.6
(b)(2)(ii)(B)	Tank overfill	Sections 2.1.9 and 3.1
(b)(2)(ii)(C)	Tank failure	Not applicable
(b)(2)(ii)(D)	Piping rupture	Not applicable
(b)(2)(ii)(E)	Piping leak	Not applicable
(b)(2)(ii)(F)	Explosion or fire	Section 1.6.2
(b)(2)(ii)(G)	Equipment failure	Sections 1.6 and 2.1.6
(b)(2)(iii)	List of equipment and responsibilities for mitigation of average most probable discharge	Sections 3.5 and 3.6
(b)(3)(i)	Facility's personnel responsibilities	Sections 1.1, 3.3; Table 1-1; and Figure 1-1
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OIL DISCHARGE PREVENTION AND CONTINGENCY PLAN

CROSS REFERENCE TO
U.S. COAST GUARD AND DEPARTMENT OF HOMELAND SECURITY
RESPONSE PLANS FOR OIL FACILITIES
TRANSFERRING OIL OR HAZARDOUS MATERIAL IN BULK
[33 CFR 154]
(CONTINUED)

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(b)(4)(ii)(A)	List of sensitive areas	Sections 1.6.12 and 3.10.2
(b)(4)(ii)(B)	Procedures to protect sensitive areas	Sections 1.6.5, 1.6.12, and 3.10
(b)(4)(ii)(C)	Depict response actions on map	Section 1.6.12
(b)(4)(iii)(A)	Personnel and equipment to protect sensitive areas	Sections 1.6.12 and 1.6.13
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(b)(4)(iii)(B)(3)	Distance spill reaches in 24 hours at maximum current for discharge to non-tidal waters	Not applicable; no discharge possible to streams
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(e)(1)(i)	Physical description of facility	Section 3.1
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(e)(5)	Site-specific Health and Safety Plan	Section 1.3
(e)(6)	List of acronyms and definitions	Acronyms List

POTENTIAL DISCHARGES

Average Most Probable Discharge

The average most probable discharge is calculated as approximately 0.5 barrel (bbl) of diesel fuel, based on the definition contained in 33 CFR 154.1020 (the lesser of 50 bbl or 1 percent of the volume of the worst case discharge [WCD]).

Maximum Most Probable Discharge

The maximum most probable discharge is 5.0 bbl of diesel fuel, calculated from the definition contained in 33 CFR 154.1020 (the lesser of 1,200 bbl or 10 percent of the volume of the WCD).

Worst Case Discharge

The WCD (for the purposes of the USCG) is 2,000 gallons (48 bbl), as calculated in Section 1.6 based on the definition contained in 33 CFR 154.1029(b)(2), using the following values:

- *Maximum Time to Discover Release:* 5 minutes
- *Maximum Time to Shutdown Pumping:* 0.5 minutes (30 seconds)
- *Maximum Transfer Rate:* 320 gallons per minute (gpm) (based on representative fuel transfer pumps on the oil spill response vessel (OSRV) = 7.6 bbl/min
- *Total Line Drainage Volume:* 163 gallons (premising 4-inch by 250-meter (m) marine hose between the pump manifold on the barge and the delivery flange on the inlet piping at the drilling vessel) or 3.9 bbl.

Type of product spilled: Low-sulfur Arctic diesel (Refer to Appendix E)

Cause: Hose flange cracks and/or hose ruptures during diesel fuel transfer operations to the *Kulluk* or *Frontier Discoverer*

Environmental conditions: Winds 10 knots northeast (prevailing wind direction), clear skies, average temperature 44° F (average for August)

Spill trajectory: Approximately 10 percent of the spill is contained on the deck of the fueling barge, and 90 percent of the spilled diesel enters the water. Current is assumed to be 0.75 knots to the west-northwest.

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SHELL OFFSHORE INC.
OIL DISCHARGE PREVENTION AND CONTINGENCY PLAN

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LIST OF ACRONYMS

AAC	Alaska Administrative Code
ACP	Area Contingency Plan
ACS	Alaska Clean Seas
ADEC	Alaska Department of Environmental Conservation
ADNR	Alaska Department of Natural Resources
AES	ASRC Energy Service
AES	ASRC Energy Services, Inc. (Oil Spill Response Contractor)
AEWC	Alaska Eskimo Whaling Commission
ANWR	Arctic National Wildlife Refuge
AOGCC	Alaska Oil and Gas Conservation Commission
API	American Petroleum Institute
ARRT	Alaska Regional Response Team
ASI	Airborne Support, Inc.
ASRC	Arctic Slope Regional Corporation
ASTM	American Society for Testing and Materials
BAT	Best Available Technology
bbl	barrels
BLM	Bureau of Land Management
BMPs	Best Management Practices
BOP	Blowout Preventer
bopd	barrels of oil per day
BOPE	Blowout Prevention Equipment
BPXA	BP Exploration (Alaska) Inc.
CAA	Conflict Avoidance Agreement
CFR	Code of Federal Regulations
C-Plan	Oil Discharge Prevention and Contingency Plan
CRT	Crisis Response Team
DOT	U.S. Department of Transportation
EPA	U.S. Environmental Protection Agency
ESI	Environmental Sensitivity Index
FLIR	forward looking infrared radar
FOSC	Federal On-Scene Coordinator
GMDSS	Global Maritime Distress and Safety System
gpm	gallons per minute
H_2S	hydrogen sulfide
HAZWOPER	Hazardous Waste Operations and Emergency Response
HDPE	High-density polyethylene
HSE	Health, Safety, and Environment

IAP	Incident Action Plan
ICP	Incident Command Post
ICS	Incident Command System
IMT	Incident Management Team
IMT	Incident Management Team
ISB	In situ burning
Kg/m^2	kilograms per meter squared
kW	kilowatt
L/T	Level/Temperature
LMRP	Lower Marine Riser Package
LOSC	Local On-Scene Coordinator
LS	Level Sensors
m	meters
MAD	Mutual Aid Drill
MHz	megahertz
MMOs	Mammal Observers
MMS	Minerals Management Service
MODU	Mobile Offshore Drilling Unit
MSRC	Marine Spill Response Corporation
NIMS	National Incident Management System
NOAA	National Oceanic and Atmospheric Administration
NPRA	National Petroleum Reserve Alaska
NPREP	National Preparedness for Response Exercise
NRC	National Response Center
NRDA	Natural Resources Damage Assessment
NSB	North Slope Borough
NSSRT	North Slope Spill Response Team
OCS	Outer Continental Shelf
OIM	Offshore Installation Manager
OOPS	O'Brien's Oil Pollution Services
OPA 90	Oil Pollution Act of 1990
OSRB	Oil Spill Recovery Barge
OSRO	Oil Spill Removal Organization
OSRV	Oil Spill Response Vessel
PEL	permissible exposure level
PLC	programmable logic controller
PPE	personal protective equipment
PSI	Pounds Per Square Inch
psig	pounds per square inch gauge
QI	Qualified Individual

RAR	Real Aperture Radar
RPS	Response Planning Standard
RRT	Regional Response Team
RTOC	Real Time Operations Center
RTTI	Real Time Traffic and Travel Information
SAR	Synthetic Aperture Rada
SCAT	Shoreline Cleanup Assessment Technology
Shell	Shell Offshore Inc.
SMT	Spill Management Team
SOSC	State On-Scene Coordinator
SPCC	Spill, Prevention, Control, and Countermeasure
SRT	Spill Response Team
SSB	Single Sideband
TF	Task Force
UHF	Ultra High Frequency
USCG	U.S. Coast Guard
VHF	Very high frequency
VSAT	Very Small Aperture Terminal
WBS	Web-based System
WCD	Worst Case Discharge

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INTRODUCTION

This Oil Discharge Prevention and Contingency Plan (C-Plan) has been developed for Shell Offshore Inc. (Shell), and is one important element of Shell's overall commitment to conduct its operations in a safe and environmentally sensitive manner. Oil spill prevention is Shell's first priority. That commitment is evident throughout the multitude of plans developed by Shell for its Beaufort Sea exploratory drilling program, as well as the many local, state, and federal permit applications Shell has submitted or will submit to secure required authorizations prior to initiating its drilling program. This C-Plan is specifically designed to aid Shell in its efforts to prevent spills and, in the unlikely event of a spill, mitigate the impacts of that spill on the marine environment.

Shell Exploration and Production Company address, telephone, and fax numbers are provided below:

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Houston, TX 77054
Phone: (504) 728-4369

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Phone: (907) 770-3700

The Shell Beaufort Sea Exploration Program goal is to permit and drill exploration wells within a geographic region representing current and future offshore lease holdings within the Beaufort Sea (see regional map Figure I-1) bounded by the following coordinates:

- 69º 57' 0" N – 71º 30' 0" N latitude, and
- 141º 48' 0" W – 156º 0' 0" W longitude.

The current and expected future leases and bottom hole locations are expected to be located on the federal Outer Continental Shelf (OCS) as regulated by the U.S. Department of Interior, Minerals Management Service (MMS), and all exploration activities will be conducted in compliance with applicable local, state, and federal laws.

Shell recognizes the harsh conditions associated with operating in the Arctic and is committed to the prevention of oil spills of any size. To achieve this goal, Shell's preparation in terms of personnel training, equipment and operating conditions are geared to the preservation of well control and prevention of oil spills:

- Fuel transfers will be conducted in strict accordance with U.S. Coast Guard-approved procedures on board each vessel.
- Pollution prevention equipment, maintenance and surveillance will be focused on the prevention of unauthorized discharges.
- The design of drilling procedures will ensure our ability to maintain primary well control at all times.
- Equipment for secondary well control will be maintained in top condition, including functional testing as required.

- A state of the art weather and ice forecasting and monitoring program will be in place to ensure safe operations.

- Deployment of ice breakers and the use of dynamic ice management will protect the drilling fleet enabling the rig to maintain station and ensuring the safety of personnel and operations.

- Real time operations monitoring using state of the art equipment will ensure early recognition of subsurface pressure increases and provide for a timely response to subsurface conditions.

Shell proposes to conduct its exploratory drilling activity using a minimum of two rigs. The first rig is the M.V. *Kulluk*, a Shell-owned Mobile Offshore Drilling Unit (MODU) with extensive prior experience drilling in the Chukchi and Beaufort seas, and the second is the *Frontier Discoverer*, a drilling ship which is currently being refurbished for use in the Arctic. Both drilling vessels will be operated by Frontier Drilling under Shell supervision.

Shell is confident that either of its drilling rigs could be moved quickly in the event of a blowout, allowing that rig to drill its own relief well; however, the availability of a second rig simply provides an additional level of confidence that well control could be secured under a broader range of possible conditions.

The first season in a multi-year program is anticipated to begin in 2007. During the 2007 season, Shell plans to mobilize the *Kulluk* and the *Frontier Discoverer* to drill several wells on up to two prospects:

- Sivulliq, located approximately 12 miles north of Flaxman Island, and
- Olympia, located approximately 16 miles northwest of the village of Kaktovik.

The *Kulluk* and *Frontier Discoverer* will be mobilized to well locations on these prospects from their current locations in McKinley Bay, Canada, and Singapore, respectively. The drilling rigs will be stocked with most of the drilling supplies needed to complete the 2007 program, although some deliveries of fuel and remaining items are expected to be performed by barge and helicopter during the season. Arctic-class ice-breakers and anchor handling vessels will accompany each drilling vessel. Access to the sites will be via helicopter and support vessels.

During mobilization and subsequent drilling operations, every reasonable effort will be made to minimize conflict with the fall bowhead whale migration and related harvest conducted by the villages of Kaktovik and Nuiqsut. Shell has commenced negotiations for a Conflict Avoidance Agreement (CAA) with the Alaska Eskimo Whaling Commission (AEWC), a non-profit organization that manages subsistence whaling activity that will include the mitigation of potential impacts arising from the proposed 2007 drilling program. In addition, it is Shell's intent to adopt a Good Neighbor Policy that specifically addresses and mitigates the impacts of a spill on the subsistence lifestyle of the local residents.

Shell currently expects to drill multiple wells on the Sivulliq and Olympia prospects during the Beaufort Sea open water season between August 1 and October 31, 2007. Non-critical drilling activities, including setting conductor casing and surface casing may be performed at either end or beyond the open water season, subject to consultation and approval by MMS, safe working conditions, weather, ice, and other environmental factors.

Activities at each drilling location may vary slightly. Plans, diagrams, and specific information for each proposed well for a specified exploration season are provided in annual project-specific permit application packages submitted to the agencies for review. MMS and the Alaska Department of Environmental

Conservation (ADEC) will receive a detailed package and be able to review the well location for coverage under this C-Plan.

Shell's Beaufort Sea Exploration C-Plan regional applicability is based on demonstrating a spill response capability up to 150 miles from a known infrastructure, such as Prudhoe Bay, or remote year-round aircraft-supported infrastructure. The plan is based on the deployment of oil spill response vessels and equipment "on the water," capable of providing an immediate response to oil spills in two discrete planning regimes:

- A spill response scenario written in compliance with MMS and ADEC regulations, based on open water conditions; and
- An associated response strategy that demonstrates regional response capability under different accessibility criteria and assumptions.

It is Shell's intent that the C-Plan serve as a regional oil spill response plan for the Beaufort Sea Exploratory Drilling Program, which is anticipated to run through 2009. This C-Plan is intended to be a planning document to help identify and establish the basis for Shell's oil spill prevention and recovery in the event of an oil spill, and as such, by its very nature, it cannot anticipate all possible contingencies. Shell plans to submit permit applications to local, state, and federal agencies containing site-specific well locations and other data in advance of each exploratory drilling season, which premises that drilling may be underway on up to two exploration wells at any given time. Federal and state regulators will be able to review the project-specific updates for a specified season and determine whether the Shell Beaufort Sea Exploration C-Plan is applicable for the individual well(s). Depending on the outcome of its exploration activities, Shell anticipates, in due course, to submit future applications for permits to proceed with development of its leases. This development would necessarily require a separate C-Plan to address the facilities and activities related to such development. The C-Plan follows the ADEC format set forth in Title 18 of the Alaska Administrative Code Chapter 75, Part 425 (18 AAC 75.425). Controlled copies of the plan are available at the ADEC office located at 555 Cordova Street, Anchorage, Alaska, 99501.

The C-Plan also addresses federal oil spill planning regulations of the MMS and The U.S. Coast Guard (USCG).

OBJECTIVES

The objective is to minimize potential environmental impacts and to provide for the safety of personnel during drilling operations by preventing petroleum hydrocarbon releases. Safety is a core value for Shell and is never compromised. This C-Plan also provides Shell with the background information and response planning guidelines necessary to implement an efficient, coordinated, and effective spill response.

The following types of facilities and operations are covered by this plan:

- Drilling vessels and facilities, support vessels, and related operations;
- Well testing operations;
- Storage operations (including recovered oil spill fluids); and
- Transfer options (including fuel and recovered oil spill fluids) involving Shell exploration and related support vessels.

ALASKA CLEAN SEAS TECHNICAL MANUAL

Shell is a member of Alaska Clean Seas (ACS). ACS is the primary response contractor for nearshore and shoreline spill response activities. This C-Plan incorporates references to the ACS *Technical Manual*, consisting of Volume 1, Tactics Description; Volume 2, Map Atlas; and Volume 3, Incident Management System.

Shell's primary offshore response action contractor is ASRC Energy Services (AES), a subsidiary of Arctic Slope Regional Corporation (ASRC). AES's scope of work will include the provision of oil spill response equipment and response personnel available on standby while critical drilling operations are underway as well as response in the event of an actual oil spill incident, including related maintenance, ongoing assurance of response capabilities and coordination of all training activities. AES will conduct response activities using ACS tactics, as defined in the ACS *Technical Manual*, or otherwise as defined in this C-Plan.

PLAN DISTRIBUTION

The C-Plan is distributed to Shell management, staff, and regulatory agencies as appropriate. This C-Plan is accessible to Shell employees and contractors on Shell's intranet website.

UPDATING PROCEDURES

The C-Plan is reviewed and updated when major changes occur in the ability to respond to the worst case discharge, or when such changes could affect the implementation of the C-Plan. Below is a list of key factors that may cause revisions to the plan:

- Changes to response planning standards**,**
- Change in oil spill response organizations,
- Change in Qualified Individual (QI),
- Changes in a National Contingency Plan or Area Contingency Plan that have a significant impact on the appropriateness of response equipment or response strategies,
- Change in response procedures, or
- Change in ownership**.**

In addition, it is Shell's intent to provide administrative updates to drilling locations, vessel names, and other routine information of a project-specific nature, in advance of each exploration season, either as an update to the C-Plan or as part of annual permit applications, as appropriate.

TABLE I-1
RENEWAL REQUIREMENT

AGENCY	CITATION	REQUIREMENT
ADEC	18 AAC 75.415	Every five years from the date of approval or when changes are made that diminish the ability to respond.
MMS	30 CFR Part 254.30	Every two years, or when there is a reduction in response capabilities.
USCG	33 CFR Part 154	Annual review by operator. Resubmit every 5 years.

Amendment or updates to the C-Plan are submitted to the appropriate regulatory agency for review and approval. Once the amendment or update has been approved, it is posted on the intranet site, and hardcopies are distributed to all plan holders. Plan holders are requested to replace the hard copy pages. Revisions are documented in the Record of Revisions history table, which is included with each approved amendment distribution. It is the responsibility of each plan holder to incorporate amendments or updates into the plan.

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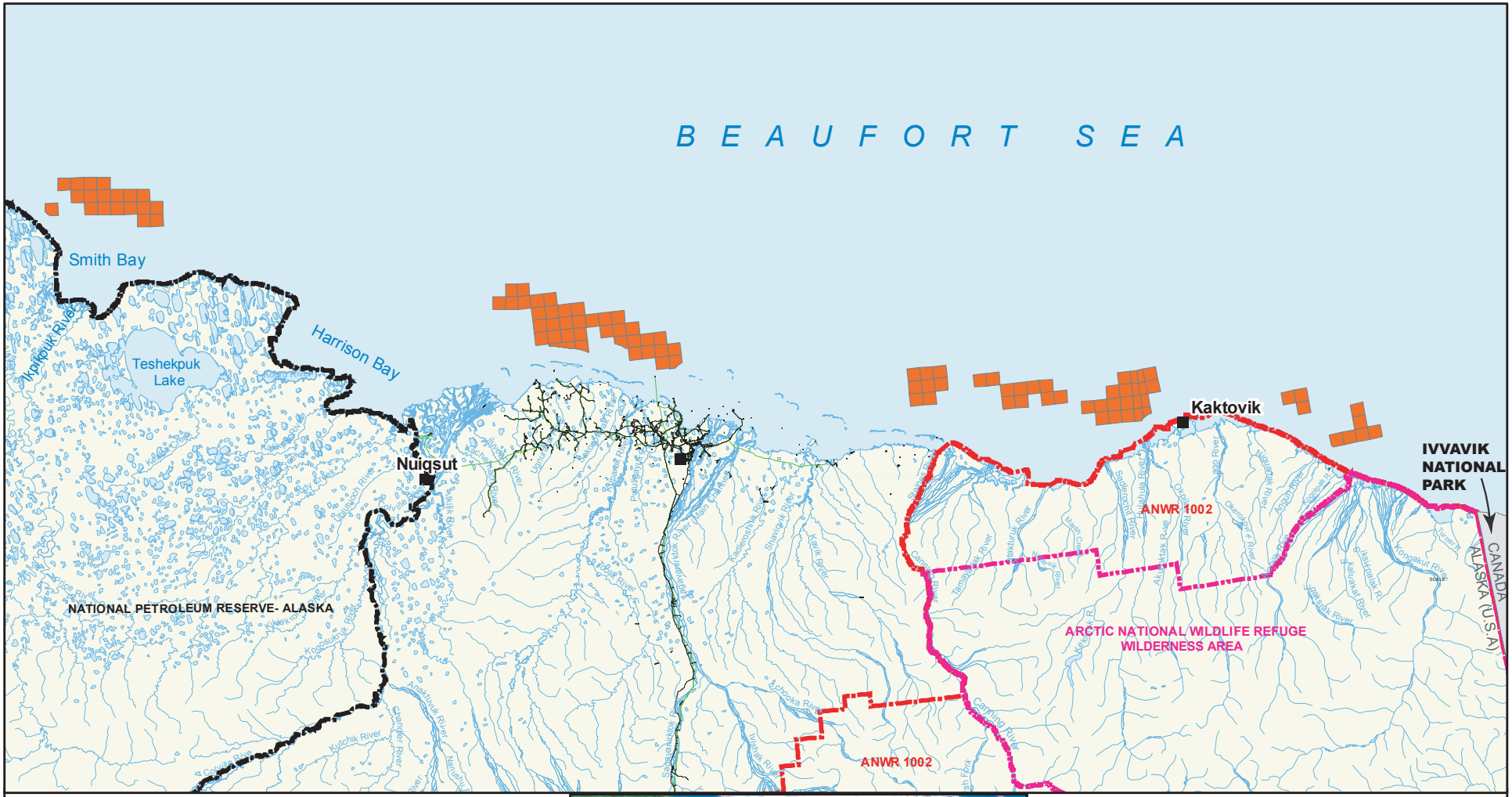
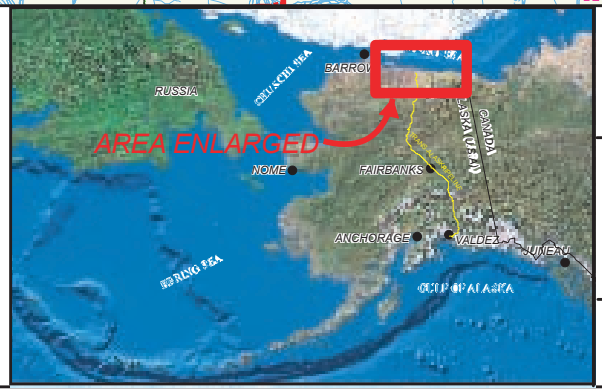


- Populated Places
- Roads
- Pipelines
- Arctic National Wildlife Refuge (ANWR)
- ANWR Wilderness Area
- National Petroleum Reserve - Alaska
- Shell Oil & Gas Leases

Projection Alaska Albers Equal Area Conic.
Lease data provided by Mapmakers
Alaska Inc. (© 2001 Mapmakers Alaska).

SCALE: 0 10 20 40 Miles



SHELL OFFSHORE, INC.

EXPLORATION PLAN-2007 PROGRAM REGIONAL MAP

December 2006 | Figure I-1

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TABLE I-2
LEASES OWNED BY SHELL AND PARTNER COMPANIES
IN THE EASTERN BEAUFORT SEA (AS OF NOVEMBER 2006)

PROTRACTION AREA	OPD NO.	BLOCK NO.	MMS LEASE # OCS-Y-
Barter Island	NR 07-03	7067	1848
Barter Island	NR 07-03	7117	1849
Demarcation Point	NR 07-05	6019	1852
Demarcation Point	NR 07-05	6020	1853
Barter Island	NR 07-03	6962	1845
Barter Island	NR 07-03	6963	1846
Barter Island	NR 07-03	7013	1847
Flaxman Island	NR 06-04	6657	1804
Flaxman Island	NR 06-04	6658	1805
Flaxman Island	NR 06-04	6659	1806
Flaxman Island	NR 06-04	6707	1807
Flaxman Island	NR 06-04	6708	1808
Flaxman Island	NR 06-04	6709	1809
Flaxman Island	NR 06-04	6757	1812
Flaxman Island	NR 06-04	6758	1813
Harrison Bay	NR 05-04	6173	1742
Harrison Bay	NR 05-04	6222	1743
Harrison Bay	NR 05-04	6223	1744
Beechey Point	NR 06-03	6152	1761
Beechey Point	NR 06-03	6202	1762
Beechey Point	NR 06-03	6203	1763
Beechey Point	NR 06-03	6204	1764
Beechey Point	NR 06-03	6253	1767
Beechey Point	NR 06-03	6254	1768
Beechey Point	NR 06-03	6255	1769
Beechey Point	NR 06-03	6256	1770
Beechey Point	NR 06-03	6303	1772
Beechey Point	NR 06-03	6304	1773
Beechey Point	NR 06-03	6305	1774
Beechey Point	NR 06-03	6306	1775
Beechey Point	NR 06-03	6307	1776
Beechey Point	NR 06-03	6308	1777
Beechey Point	NR 06-03	6309	1778
Beechey Point	NR 06-03	6353	1780
Beechey Point	NR 06-03	6354	1781
Beechey Point	NR 06-03	6355	1782
Beechey Point	NR 06-03	6356	1783
Beechey Point	NR 06-03	6406	1788
Beechey Point	NR 06-03	6411	1791
Beechey Point	NR 06-03	6412	1792
Beechey Point	NR 06-03	6460	1793
Beechey Point	NR 06-03	6461	1794

TABLE I-2 (CONTINUED)
LEASES OWNED BY SHELL AND PARTNER COMPANIES
IN THE EASTERN BEAUFORT SEA (AS OF NOVEMBER 2006)

PROTRACTION AREA	OPD NO.	BLOCK NO.	MMS LEASE # OCS-Y-
Beechey Point	NR 06-03	6462	1795
Beechey Point	NR 06-03	6463	1796
Beechey Point	NR 06-03	6512	1799
Beechey Point	NR 06-03	6513	1800
Beechey Point	NR 06-03	6404 A	1787
Flaxman Island	NR 06-04	6712	1810
Flaxman Island	NR 06-04	6713	1811
Flaxman Island	NR 06-04	6764	1816
Flaxman Island	NR 06-04	6814	1822
Flaxman Island	NR 06-04	6815	1823
Flaxman Island	NR 06-04	6765	1817
Flaxman Island	NR 06-04	6766	1818
Flaxman Island	NR 06-04	6767	1819
Flaxman Island	NR 06-04	6817	1824
Flaxman Island	NR 06-04	6818	1825
Flaxman Island	NR 06-04	6773	1820
Flaxman Island	NR 06-04	6774	1821
Flaxman Island	NR 06-04	6822	1826
Flaxman Island	NR 06-04	6823	1827
Flaxman Island	NR 06-04	6824	1828
Flaxman Island	NR 06-04	6873	1833
Flaxman Island	NR 06-04	6874	1834
Flaxman Island	NR 06-04	6923	1837
Flaxman Island	NR 06-04	6924	1838
Barter Island	NR 07-03	6751	1839
Barter Island	NR 07-03	6752	1840
Barter Island	NR 07-03	6801	1841
Barter Island	NR 07-03	6802	1842
Barter Island	NR 07-03	6851	1843
Barter Island	NR 07-03	6901	1844
Demarcation Point	NR 07-05	6017	1850
Demarcation Point	NR 07-05	6018	1851
Beechey Point	NR 06-03	6358	1784
Beechey Point	NR 06-03	6359	1785
Beechey Point	NR 06-03	6360	1786
Beechey Point	NR 06-03	6409	1789
Beechey Point	NR 06-03	6410	1790
Flaxman Island	NR 06-04	6870	1830
Flaxman Island	NR 06-04	6871	1831
Flaxman Island	NR 06-04	6872	1832
Flaxman Island	NR 06-04	6921	1835
Flaxman Island	NR 06-04	6922	1836

TABLE I-2 (CONTINUED)
LEASES OWNED BY SHELL AND PARTNER COMPANIES
IN THE EASTERN BEAUFORT SEA (AS OF NOVEMBER 2006)

PROTRACTION AREA	OPD NO.	BLOCK NO.	MMS LEASE # OCS-Y-
Harrison Bay	NR 05-04	6369	1699
Harrison Bay	NR 05-04	6370	1700
Harrison Bay	NR 05-04	6419	1701
Harrison Bay	NR 05-04	6420	1702
Harrison Bay	NR 05-04	6421	1703
Beechey Point	NR 06-03	6352	1704
Beechey Point	NR 06-03	6402 & 6403	1705
Harrison Bay	NR 05-04	6272	1745
Harrison Bay	NR 05-04	6273	1746
Harrison Bay	NR 05-04	6320	1747
Harrison Bay	NR 05-04	6321	1748
Harrison Bay	NR 05-04	6322	1749
Harrison Bay	NR 05-04	6323	1750
Harrison Bay	NR 05-04	6371	1751
Harrison Bay	NR 05-04	6372	1752
Harrison Bay	NR 05-04	6373	1753
Harrison Bay	NR 05-04	6374 & 6424	1754
Harrison Bay	NR 05-04	6418	1755
Harrison Bay	NR 05-04	6422	1756
Harrison Bay	NR 05-04	6423	1757
Harrison Bay	NR 05-04	6468	1758
Harrison Bay	NR 05-04	6469	1759
Harrison Bay	NR 05-04	6518 & 6519	1760
Beechey Point	NR 06-03	6251 & 6301	1765
Beechey Point	NR 06-03	6252	1766
Beechey Point	NR 06-03	6302	1771
Beechey Point	NR 06-03	6351 & 6401	1779

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State Approval

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MMS Approval Letter

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USCG Approval Letter

-PLACEHOLDER-

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PART 1 RESPONSE ACTION PLAN [18 AAC 75.425(e)(1)]

The environment for drilling activities lies outside Alaska state waters in the Beaufort Sea. For planning purposes, a hypothetical blowout involves oil that travels upwards from the well at the ocean floor to the water surface. The resulting plume of oil is driven by ocean currents and wind. Stochastic spill modeling based on current and wind information suggests that spilled oil is not likely to reach land in less than 24 to 48 hours, even if no containment and recovery operations took place.

These timelines have been used to plan the mobilization of ACS equipment and response personnel to protect sensitive environmental sites along the shoreline (see Section 1.6.12).

1.1 EMERGENCY ACTION CHECKLIST [18 AAC 75.425(e)(1)(A)]

The person reporting an oil spill to the immediate supervisor or Qualified Individual may be required to supply minimum spill assessment information to provide as complete an understanding of the incident as possible. Some initial spill response actions and information that may be reported are included in Table 1-1 and Table 1-2.

TABLE 1-1
EMERGENCY ACTION CHECKLIST

EMERGENCY ACTION CHECKLIST	
INITIAL SPILL RESPONSE ACTIONS	**WHAT TO REPORT TO YOUR SUPERVISOR**
1. Protect people: Safety is first priority. Sound Alarm. Shut off ignition sources. Restrict Access. Evaluate as necessary and initiate rescue and response actions.	1. Was anyone hurt?
2. Notify your supervisor.	2. Where is the spill?
3. Stop the spill at source, if safe to do so.	3. What time did it happen?
4. Assess possible hazards: Fire and explosion potential of vapors at or near the source, Potential toxic effects of the discharge, Damage to facility affecting safety, and Recovery of the spilled product.	4. What was spilled?
5. For a blowout, implement well control and evacuation procedures and activate Tier Ill Incident Command System (ICS).	5. How much was spilled?
	6. What is the rate of release?
	7. What is the source?
	8. What are the weather conditions?
	9. What actions have you taken?
	10. What equipment do you need?
	11. Are there any immediate environmental impacts?
	12. Who did you notify?

The emergency action and notification sequence varies depending on the size of the spill and required response. The spill classifications described below apply only to the emergency phases of containment and initial recovery of a spill.

Spill Classification Guidelines

Tier I Spill: Local spill that the affected asset can respond to effectively with equipment and personnel on board (such as deploying absorbent containment and recovery materials). No immediate off-site assistance is needed (Table 1-2).

Tier II Spill: Large spill that would require mobilization of the Incident Management Team and/or all dedicated response resources identified in this C-Plan (using ASRC Energy Services [AES] services deployed offshore and if necessary, the activation of Alaska Clean Seas [ACS]).

Tier III Spill: Large spill with potential to require mobilization of all resources listed above for Tier II plus additional national or international resources not specified in this C-Plan.

TABLE 1-2
INITIAL SPILL RESPONSE AND
NOTIFICATION PROCESS – TIER 1 SPILL

TIER I SPILL	
PERSONNEL	**ACTION TO BE TAKEN**
FIRST PERSON TO SEE THE SPILL	Assess safety of situation, determine whether source can be stopped, and stop the source of spill if possible. Immediately notify your supervisor. If your supervisor is not available, notify the on-scene Incident Commander/Qualified individual (QI).
INITIAL ON-SCENE INCIDENT COMMANDER/QI **(Drilling Foreman)**	From a safe distance, determine that the spill is stopped or contained. Call the Incident Commander/QI. Call Drilling Superintendent (if not available, call Wells Manager). Complete applicable spill report form (Figure 1-2). Respond as directed by Incident Commander to contain and recover spill.
INCIDENT COMMANDER/QI **(Asset Manager or designee)**	Activate appropriate components of Incident Management Team. Determine if Tier I, Tier II, or Tier III spill actions must be taken. Call the National Response Center (1–800–424–8802).

If the Initial On-scene Incident Commander or the Incident Commander determines that the spill is a Tier -II or -III event (Figure 1-1), the following additional responses and notifications should take place (Table 1-3). A summary of the emergency actions described in this manual is available for field personnel.

TABLE 1-3
INITIAL SPILL RESPONSE AND NOTIFICATION PROCESS – TIER II OR TIER III SPILL

TIER II OR TIER III SPILL	
PERSONNEL	**ACTION TO BE TAKEN**
INCIDENT COMMANDER/QI	Gather information; assess magnitude/severity of the spill; and notify AES, ACS, and Shell management. Complete internal and external notifications. Notify the National Response Center (1–800–424–8802). Establish objectives and response strategies. Monitor status of incident, facility, and personnel. Work closely with Safety Officer to: assess any and all risks of accidental ignition of the blowout hot zone and safe operating distances for all operations; and need and practicality of safely and deliberately igniting the vapors over the surfacing oil plume. Mobilize resources (in addition to on-site equipment & personnel) if necessary.
LIAISON OFFICER	Confirm that all state and federal agencies and appropriate Native corporations and villages have been notified. Request safety zones for air and water. Request Notice to Mariners (U.S. Coast Guard [USCG]). Obtain approval to decant USCG. Prepare written reports to agencies.
PUBLIC INFORMATION OFFICER	Establish Joint Information Center. Activate mutual aid. Prepare for media interest. Keep the public informed. Coordinate media efforts through the Joint Information Center. Identify community concerns.
SAFETY OFFICER	Evaluate and monitor hazards. Notify offset operators. Obtain MSDS and prepare Site Safety Plan. Establish first aid posts. Coordinate search and rescue operations. Coordinate post-incident debriefing. Conduct air monitoring as may be needed. Establish initial site safety plan. Ensure HAZWOPER compliance. Investigate safety-related accidents and report to Incident Commander. Conduct safety inspections.
OPERATIONS SECTION CHIEF	Mobilize and direct on-scene response equipment and personnel. Coordinate all operations with AES, ACS, Shell's on-site response personnel, and village response teams. Ensure Shell representation at site/ staging areas. Consider pre-cleaning the shoreline prior to impact. Contact wildlife specialists and refuge managers for information. Oversee preparation of Air Operations Plan.
PLANNING SECTION CHIEF	Collect, process, and display incident information. Provide basic environmental support. Supervise development of Incident Action Plan.

1.2 REPORTING AND NOTIFICATION [18 AAC 75.425(e)(1)(B)]

1.2.1 Initial Reporting

Any Shell contractor or employee is required to report the spill to their immediate supervisor. The person in charge receiving the initial spill report, or possible spill, will assess the situation and then call the Incident Commander.

The Incident Commander will then initiate the internal and external reporting sequence to ensure proper notification of response personnel, appropriate company management and government agencies. Emergency contact telephone numbers for Shell, response action contractors, and Mutual Aid (if required) are included in Table 1-4. Agency and External Notification Information (including Native corporations and villages) are included in Table 1-5.

The Shell spill report form (Figure 1-2) must be completed for any reportable spills.

FIGURE 1-1
INTERNAL EMERGENCY NOTIFICATION PROCESS DIAGRAM

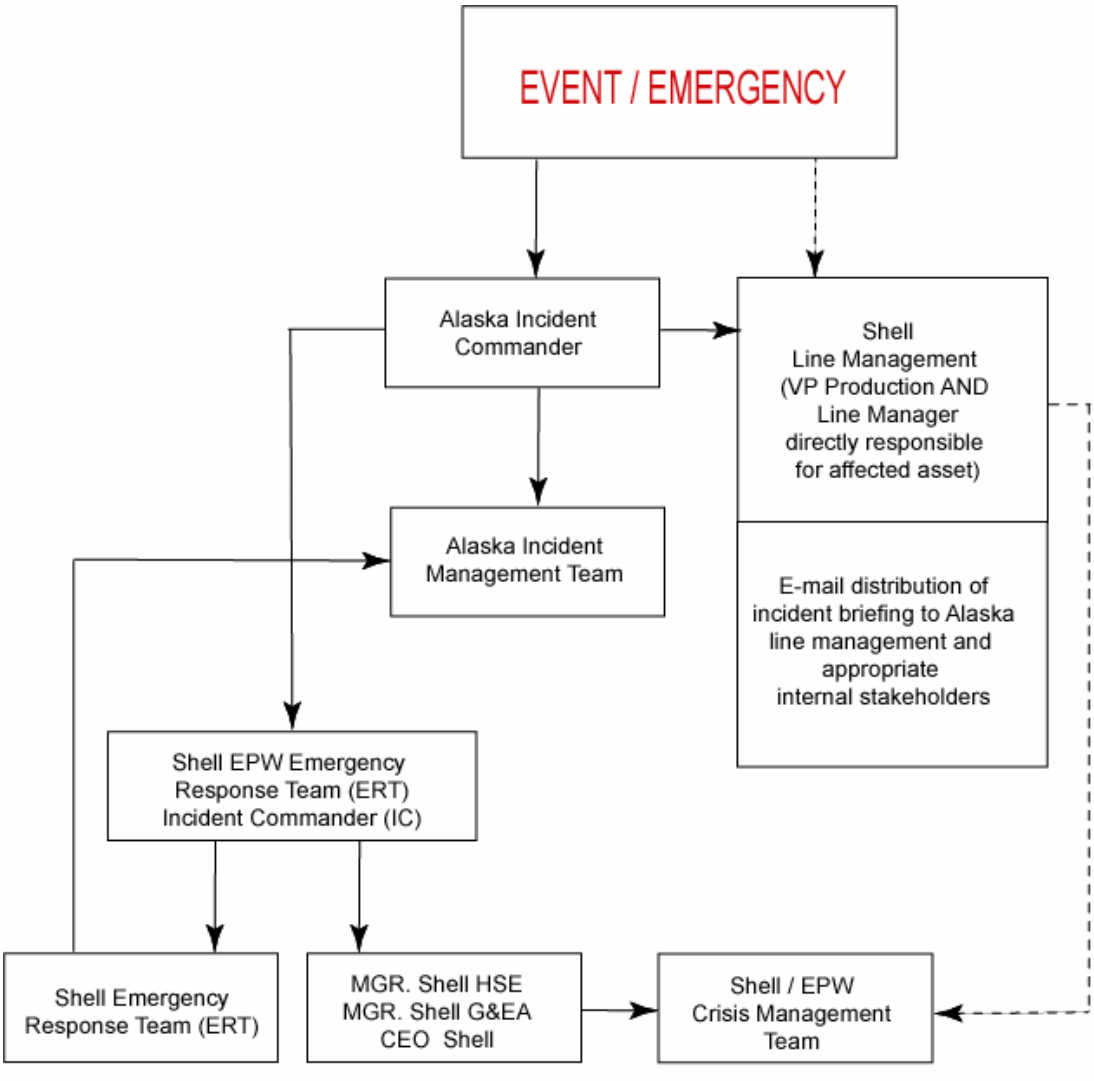


TABLE 1-4
EMERGENCY CONTACT LIST

SHELL OFFSHORE INC. CONTACT LIST		
SHELL OFFSHORE INC.	***KULLUK***	***FRONTIER DISCOVERER***
Security	(907) 264-7777	(907) 264-7777
Alaska Asset Manager (IC)	(907) 770-3700	(907) 770-3700
Wells Manager	(281) 544-2151	(281) 544-2151
Drilling Superintendent	(713) 546-6668	(713) 546-6668
Regulatory Affairs Manager	(504) 728-4252	(504) 728-4252
HSE Environmental Manager	(907) 854-0073	(907) 854-0073
Environmental / SD Advisor	(713) 546-6124	(713) 546-6124
Drilling Engineer	(713) 546-6674 Cell (713) 898-7104	(713) 546-6675
Drilling Team Leader	(713) 948-1169	(713) 948-1169
Technical Advisor, Spiltec (Al Allen) (425) 869-0988		

OIL SPILL RESPONSE ORGANIZATIONS	
ASRC Energy Services (AES), Address: 3900 C Street, Anchorage, Alaska 99503	
Main number Anchorage	(907) 339-6200
AES Operations Manager	(907) 339-6200
Alaska Clean Seas (ACS), Address: Pouch 340022, Prudhoe Bay, Alaska 99734	
Main Number Prudhoe Bay	(907) 659-2405
ACS Operations Manager	(907) 659-3202
North Slope Mutual Aid (if applicable) handled through ACS	(907) 659-2405

NOTE: PLEASE REFER TO TABLE 1-5 AGENCY AND EXTERNAL NOTIFICATION INFORMATION FOR FURTHER EMERGENCY CONTACT NUMBERS.

FIGURE 1-2
SHELL REPORT OF OFFSHORE ENVIRONMENTAL INCIDENT FORM

(Internal SEPCo HSE use only) **Incident Number** .

Report of Offshore Environmental Incident Form (OF-REI)

DIRECTIONS: This form is to be used to capture information that will be later entered into the IMPACT Safety database. When completing this form, please be as complete and specific as possible. When completing this form using MS Word you will only be able to enter information into the shaded portions of the form or by clicking on the check boxes. You can use the TAB key to move to the right or the DOWN ARROW key to move down on the form. You may also use your mouse to click on the cell that you want to complete.

Date of Incident	**Time of Incident**	**On SEPCo Premises** ☐ **Y** ☐ **N**

Incident Headline (Brief description of incident – 50 characters or less on the line below)

Incident Type and Location Information

☐ Spill ☐ Exceedance of discharge limits (Noncompliance) ☐ Produced water sheen
☐ Material lost overboard ☐ Complaint ☐ Fire ☐ Release ☐ Other(Describe)

Field Name **Well No./Rig** **Block** **Platform**

Latitude Longitude OCS-G#

Activity at Location
☐ Drilling/W.O./Completion ☐ Exploration ☐ Production ☐ Construction ☐ Other

Specific Operation

☐ Drilling	☐ Construction	☐ Operations	☐ Other
☐ Workover	☐ Crane operations	☐ Well servicing	
☐ Completion	☐ Equipment handling	☐ Air transport	
☐ Coil tubing	☐ Maintenance	☐ Boat/Ship	

Source (Check all that apply)

☐ Drip pan	☐ Flowline	☐ Other surface	☐ Sump	☐ Tank/Vessel	☐ Wellhead
☐ Flare	☐ Hoses	☐ Pipeline	☐ Rotating equipment	☐ Transfer equipment	☐ Other

Environment Affected
☐ Water ☐ Air

What was spilled or released?

Report spilled or released volume expressing liquid in gallons, dry chemicals in pounds and air emissions in Standard Cubic Feet.

Gallons (gal) **Pounds (lbs)** **Standard Cubic Feet (SCF)**

OIL SPILL INFORMATION

Sheen colors ☐ Barely Visible (spill factor = 0.000008) ☐ Silvery (spill factor = 0.000016)
☐ Slight Color (spill factor = 0.000032) ☐ Bright Color (spill factor = 0.000065)
☐ Dull (spill factor = 0.00022) ☐ Dark (spill factor = 0.00043)

Size of the sheen yards by yards Estimated volume of the spill (yards **x** yards **x** spill factor) = **gallons**

Was the sheen ☐ captured/cleaned up ☐ allowed to disperse naturally

How long did the sheen last before natural dispersion or cleaned up? hours

Weather Information

Est. current speed	Direction **(to)**	Estimated wave height	Est. wind speed	Direction **(from)**

Liquid Spill Properties (for spills larger than 6 barrels)

API Gravity **Pour Point**

Visibility(nautical miles) Ceiling (feet) Ambient temp. (°F.)

Source Control

Describe how and when the source of the spill or discharge was stopped

Describe what was/will be done specifically to prevent reoccurrence? (Procedures changed, equipment repaired, etc)

What was the cost of repairs/cleanup (Include equipment, repair time, transportation, etc.)

EXCEEDANCE OF DISCHARGE LIMITS (NONCOMPLIANCE)

Did a sample fail a Permit test? ☐ **Y** ☐ **N** ☐ **Static sheen** ☐ **Produced H_2O sheen**

Oil and Grease mg/l **Sanitary chlorine** mg/l **Toxicity** ppm

Full Description (How did the incident occur?)
(Attach additional sheets, if necessary, to complete event description)

FIGURE 1-2 (CONTINUED)
SHELL REPORT OF OFFSHORE ENVIRONMENTAL INCIDENT FORM

(Internal SEPCo HSE use only) **Incident Number**_____.

INCIDENT IMPACT (Actual)					
Actual Impact on Environment	☐ **Slight Effect** – Less than 1 barrel spill	☐ **Minor Effect** – Greater than 1 barrel spill, INC or non-compliance	☐ **Localized Effect** – Greater than 5 barrels spilled or chemical reportable quantity (RQ)	☐ **Major Effect** – Spill response initialization required	☐ **Massive Effect**
Actual Impact on Assets ☐ **None**	☐ No disruption to operation	☐ Brief disruption	☐ Partial shutdown, can be restarted	☐ Partial operational loss up to 2 weeks	☐ Substantial or total loss of operation
Actual Impact on Reputation ☐ **None**	☐ Slight	☐ Limited	☐ Considerable	☐ Major National	☐ Major International

Type of Complaint (☐ **Check if none**)

☐ Blast/Vibration ☐ Lights ☐ Odor/Fumes ☐ Debris ☐Noise ☐Oil Spray ☐ Smoke ☐ Flaring
☐ Other (describe)

NOTIFICATIONS

	Notified	Person's Name	Date / Time	Report number
External Notifications				
National Response Center 1-800-424-8802 (If delegated to by Incident Commander)	☐		/	
	☐		/	
Internal Notifications (all incidents)				
Incident Commander	☐		/	
Area Leader/Drilling Superintendent	☐		/	
	☐		/	

Witness(es) to the Incident

Name (Typed or Printed)	**Employer**	**Phone**

I certify that all the above information is true, accurate and complete. Under Federal law, penalties can be assessed for recording false information including fines and imprisonment.

Report submitted by

Name (Typed or Printed)	**Title**	**Phone**	**Date**

Approvals and/or reviewers

Name (Typed or Printed)	**Title**	**Phone**	**Date**

Contact the HSE Incident Management Process Gatekeeper for you organization for submission instructions. You can also submit via e-mail address (incidents@shellus.com) or Fax to (907) 700-3636

1.2.2 External Notification Procedures

Appropriate agency verbal notifications and written reports may include:

- National Response Center
- MMS
- U.S. Bureau of Land Management
- U.S. Fish and Wildlife
- U.S. Environmental Protection Agency (EPA)
- USCG
- U.S. Department of Interior
- U.S Department of Transportation
- ADEC
- Alaska Oil and Gas Conservation Commission
- Alaska Department of Fish and Game
- Alaska Department of Natural Resources
- National Marines Fisheries
- North Slope Borough
- Village of Kaktovik
- Village of Nuiqsut
- Village of Barrow

See Table 1-5 for contact information.

1.2.3 Written Reporting Requirements

Depending on the type and amount of material spilled, individual government agencies have written reporting requirements, which are the responsibility of Shell. MMS, USCG, and ADEC reporting requirements will be met in the following procedures. Agency and external notification requirements, and agency reporting requirements are summarized in Tables 1-5 and 1-6, respectively.

MMS regulations require all applicable federal, state, and regulatory agencies be notified.

ADEC regulation 18 AAC 75.300 requires notification of any spill on State lands or waterways. After notification of the discharge has been made to ADEC, the department will, at its discretion, require interim reports until cleanup has been completed (18 AAC 75.307). A written final report must be submitted within 15 days of the end of cleanup operations, or, if no cleanup occurs, within 15 days of the discharge (18 AAC 75.307). This process is outlined in the ACS *Technical Manual*, Tactic A-2.

TABLE 1-5
AGENCY AND EXTERNAL NOTIFICATION INFORMATION

AGENCY	PHONE	FAX
National Response Center (NRC)	(800) 424-8802	
Environmental Protection Agency (EPA) (NRC will call)	(907) 271-5083	(907) 271-3424
Carl Lautenberger (EPA) direct line	(907) 271-1273	
ADEC - Business Hours	(907) 451-2121	(907) 451-2362
ADEC - after hours and on weekends call AK STATE TROOPERS	(800) 478-9300	
ADEC - Sewage Spills Only (Abigail Ogbe)	(907) 451-2130	(907) 451-2187
Alaska Department of Natural Resources – Oil Spill Hotline Recording	(907) 451-2678	(907) 451-2751
North Slope Borough (NSB)	(907) 561-5144	(907) 562-1940
NSB Waska Williams (Office)	(907) 852-0440	(907) 852-5991
NSB Waska Williams (Cell Phone)	(907) 367-3930	
NSB Permitting and Zoning Division	(907) 852-0320	(907) 852-5991
NSB Risk Management	(907) 852-0248	(907) 852-0356
NSB Disaster Coordinator (Pat Patterson)	(907) 852-2822, (907) 852-6111 (24 hours on call)	(907) 852-2475
US Coast Guard	(907) 271-6700	(907) 271-6765
US Fish and Wildlife Service (spills that may impact ANWR)	(907) 456-0250	(907) 456-0248
Minerals Management Service	(907) 250 - 0546	(907) 334-5302
Alaska Department of Fish and Game - Fairbanks	(907) 459-7242	(907) 452-6410
Alaska Oil and Gas Conservation Commission - Anchorage	(907) 279-1433	(907) 276-7542
Alaska Oil and Gas Conservation Commission - North Slope Inspector	(907) 659-3607 Pager, (907) 659-2714	(907) 659-2717
BLM Anchorage – NPR-A	(907) 267-1210	(907) 267-1304
BLM Fairbanks – NPR-A (Don Meares) Report seismic spills to Fairbanks only; other spills to both Fairbanks and Anchorage	(907) 474-2306	(907) 474-2386
Prudhoe Bay Weather Village of Nuiqsut Village of Kaktovik City of Barrow North Slope Borough Mayor's Office	(907) 659-5888 (907) 480-6727 (907) 640-6313 (907) 852-5211 (907) 852-0200	

TABLE 1-6
AGENCY REPORTING REQUIREMENTS FOR OIL SPILLS

		ENVIRONMENTAL COMPLIANCE INITIAL AGENCY NOTIFICATION											ADMINISTRATIVE WRITTEN REPORT (fax is acceptable)			
		AS SOON AS POSSIBLE					WITHIN 48 HRS	MONTHLY		IMMEDIATE OR AS SHOWN BELOW			5 DAYS AFTER LOSS	15 DAYS AFTER LOSS	15 DAYS AFTER CLEANUP	30 DAYS AFTER EVENT
					SPECIFIC CONDITIONS											
		NRC (EPA)	ADEC ADNR	NSB	USCG[3] MMS[5] ADF&G[6]	BLM[10]	ADEC NSB ADNR	ADEC NSB ADNR	FEDERAL LAND ONLY BLM[10]	DOT	SPCO FAX W/IN 48 HR	AOGCC[2] CRUDE GAS	AOGCC CRUDE GAS	EPA[7,14] BLM	ADEC[8] ADNR NSB	DOT[12] SPCO
OFFSHORE (DISCHARGES TO WATER)																
Sewage[8]	Any quantity	X	X											X	X	
Any oil or chemical spill	(i.e., oil, drilling fluids, glycol, produced water, or brine)	X	X	X	X	X			X			X	X	X	X	
Seawater	To seawater environment (no report)															
	Any amount seawater to freshwater environment	X	X	X	X	X			X					X	X	
STAGING AREA																
Chemicals	Exceeds Federal RQ[1]	X	X	>55 gal		>100 bbl			X					>10 bbl	X	
	Less than RQ, or has no RQ		X	>55 gal		X[4]			X						X	
Selected Hazardous Substances[13]	>55 gallons		X	X					X						X	
	10 to 55 gallons							X	X						X	
	<10 gallons (no report)															
Seawater	To seawater environment (no report)															
	>55 gallons to freshwater environment					>100 bbl	X		X					>10 bbl	X	
	10 to 55 gallons to freshwater environment							X	X						X	
	<10 gallons to freshwater environment (no report)															
Sewage[8]	Any quantity						X[8]								X	
Oil	>55 gallons		X	X		>100 bbl or 500 mcf gas			X			X	X	>10 bbl or 50 mcf gas	X	
	10 to 55 gallons						X		X			>25 gal	X		X	
	1 to 10 gallons (<1 gallon = no report)							X	X				X		X	
IN CONTAINMENT																
Chemicals	Air release, with RQ	X	X						X						X	
	Less than RQ or has no RQ[15]															
Sewage[8]	Any quantity (no report)															
Oil, Glycol, and Select Hazardous Sub.[13]	>55 gallons (less than = no report)		X			>100 bbl or 500 mcf gas			X			X	X	>10 bbl or 50 mcf gas	X	

TABLE 1-6 (CONTINUED)
AGENCY REPORTING REQUIREMENTS FOR OIL SPILLS

Notes: “Oil” includes crude, diesel, gasoline, hydraulic fluid, transmission fluid, and therminol.

1. Chemicals with Federal RQs include ethylene glycol at 540 gal; methanol (pure) at 750 gal. Chemicals without RQs include sewage, produced water, and seawater.
2. Crude oil spills >25 gal; notify AOGCC Slope Rep. Crude spills >10 bbl, notify AOGCC Slope Rep.
3. All oil spills to or threatening navigable waters.
4. Offshore rig spills <42 gal, call NRC. Spills >42 gal, call MMS directly.
5. Any release to fish bearing water bodies.
6. EPA letter required for oil spills >1,000 gal, all off pad oil spills and storm water releases of oil or chemicals >RQ.
7. Sewage, including domestic wastewater and gray water, spills are reportable to ADEC Wastewater Program; written report due 7 days after event.
8. No notification required for snow covered tundra unless >100 bbl, or unless penetrates tundra.
9. Use Form MMS-3160. Reporting required for federal lands only.
10. See Off Pad, On Pad, Ice Pad/Ice Roads, and In Containment reporting requirements to determine reporting to these agencies.
11. Glycols, brines, drilling fluids, seawater, produced water, or methanol diluted with 40% or more water.
12. Detailed report must be submitted to EPA within 60 days if oil discharge is over 1,000 gal in a single event or more than 42 gal of oil in each of two discharges within any 12 month period.
13. Field Environmentalist must evaluate available information (MSDS, test data, or process knowledge) to determine if spilled substance is a hazardous substance. Reporting is not required if a non-hazardous determination is made.

Interim and final written reporting requirements are specified in 18 AAC 75.300. The report must contain the following information:

- Date and time of discharge;
- Location of discharge;
- Name of facility or vessel;
- Name, mailing address, and telephone number of person or persons causing or responsible for the discharge and the owner and the operator of the facility or vessel;
- Type and amount of each hazardous substance discharged;
- Cause of the discharge;
- Description of any environmental damage caused by the discharge or containment to the extent the damage can be identified;
- Description of cleanup actions taken;
- Estimated amount of hazardous substance cleaned up and hazardous waste generated;
- Date, location, and method of ultimate disposal of the hazardous substance cleaned up;
- Description of actions being taken to prevent recurrence of the discharge; and
- Other information the department requires to fully assess the cause and impact of the discharge.

1.3 SAFETY [18 AAC 75.425(e)(1)(C)]

Based on applicable safety standards, a description of the steps necessary to develop an incident-specific safety plan for conducting a response are included in the following documents:

- The ACS *Technical Manual* Tactics S-1 through S-6, include site entry procedures, site safety plan development, and personnel protection procedures.
- The AES *Response Tactics Manual*
- The *Shell Contractor Safety Handbook*
- Shell's HSE Policy Statement and HSE Management System.

Mandatory safety orientations are conducted for all Shell employees and contractors working at Shell operated facilities, including additional training for employees in safety-critical positions.

The Shell well plans, prepared for each drilling operation conducted in the Beaufort Sea, are designed to ensure drilling activities are performed in a safe and environmentally sound manner. Each plan identifies the procedures, systems, and equipment employed in drilling; uses the best technical information available concerning subsurface formation characteristics and pressures; and provides information critical to the success and safety of the drilling program. The site-specific evacuation plan is maintained on all Shell-owned or Shell-contracted drilling vessels and is posted throughout these facilities as part of the "Station Bill." Weekly drills are held to assure compliance.

The North Slope Borough Emergency Services Director, or designee, will work through the State On-Scene Coordinator (SOSC) within the command structure to represent affected communities.

In the event that conflicts arise with the above referenced documents while developing an incident specific safety plan, Shell procedures will take precedence as identified by the Incident Management Team (IMT) Safety Officer.

1.4 COMMUNICATIONS [18 AAC 75.425(e)(1)(D)]

1.4.1 Communications Plan

Effective communication during a spill response requires that all parties understand and use the assigned radio frequencies and telephone numbers. Use of pre-programmed and designated frequencies ensures that emergency communications are established immediately for a response. As spill response efforts grow, additional frequencies and telephone numbers may be added to a complete Communications Plan that is distributed to all parties.

The Communications Unit Leader is responsible for establishing a plan that provides coverage in the field and between the field and a command post. Communication requirements are determined by many factors, the most important of which are the location and nature of the spill response activities, and the number of staff placed in the field. Specific requirements include:

- Communications systems must be self-contained, compact, highly portable, and capable of providing all on-site and off-site communication links for the duration of the response.
- Communication equipment used in the immediate vicinity of spilled or recovered product must be intrinsically safe (explosion proof).

Field teams will work in close proximity to each other, and generally require only a single tactical communication link operating over a distance of several miles. A repeater radio link would be required to bridge worst-case distances from the field to the staging area and support teams.

A description of the statewide communications plan developed by the crude oil spill cooperatives (ACS, Cook Inlet Spill Response, Inc., Ship Escort Response Vessel System) is provided in Table 1-7. The frequencies noted have been licensed for use statewide on oil spills. The plan provides for eight fixed VHF repeaters in each cooperative area of responsibility, and six portable VHR repeaters. The radio plan also provides up to 20 VHF tactical channels and includes VHF marine channels. The plan has provisions for adding other area specific channels unique to individual cooperatives or Member Companies and uses exclusively VHF channels in the 150 to 174 MHz band.

The Alaska Statewide Frequency Plan consists of 47 channels, designated OS-29 through OS-76. When referring to these channels, the channel number is always prefixed with the letters “OS.” This clarifies the identity of the channel under discussion and minimizes potential confusion that the channel might represent a marine channel, or some other internal company channel.

TABLE 1-7
SUMMARY OF ALASKA STATEWIDE FREQUENCY PLAN CHANNELS

CHANNEL	TYPE	DESCRIPTION
OS-1 through OS-28		Reserved for individual and unique use by Member Companies and cooperatives.
OS-29 through OS-32	Tactical channels	Match marine radio channels.
OS-33 through OS-52	Fixed repeater channels (and associated talk-around channels)	Located on the North Slope, along the Alyeska Pipeline corridor, and in Cook Inlet or Prince William Sound. The talk-around channels are available for tactical use when operating in an area not covered by the associated repeater channel.
OS-53 through OS-76	Portable repeater channels (and associated talk-around channels)	Licensed for use statewide. The talk-around channels are available for tactical use when operating in an area not covered by the associated portable repeater channel.
OS-65 through OS-76	Marine Channels OS-72 is Marine 11 OS-75 is Marine 80A OS-76 is Marine Repeater 85	For both tactical, operations, and logistics use, as required. Note that marine channels are specifically given OS designations that do not reflect the actual marine channel number.
OS-77 through OS-100		Reserved for potential future expansion of the Plan.

1.4.2 Communications Equipment

ACS provides for an extensive communications network in the North Slope region, built on the basis of Very High Frequency (VHF) radio coverage. In their inventory, ACS has a satellite earth station system. Also, Ultra High Frequency (UHF) radio can be linked to VHF systems via an ACS UHF-VHF link. Details of the ACS communications resources and systems are provided in the ACS *Technical Manual* (see Tactics L-5 and L-11A).

The communication systems that may be employed in a given location or spill situation include:

- **Telephone Circuits.** Telephone systems at many company facilities are generally sufficient to handle the volume of phone calls associated with most spills. Sparsely populated areas, however, may have very limited phone service, or the reserve capacity of the system may be so small that temporary service to remote control centers cannot be quickly provided. Solutions to such potential telephone bottlenecks might include establishing microwave or satellite links to these areas using contracted resources.
- **Cellular Telephone Systems.** Standard cellular coverage in Alaska is limited to populated areas primarily in South-Central and Southeast Alaska, but coverage continues to expand rapidly within the state. The increasing availability of satellite-based cellular coverage is expected to make cellular telephone the communications system of choice. Battery-powered cellular phones are preferred, to free the user from dependence on commercial power or vehicle batteries.
- **VHF-FM Marine Radio (156-158 megahertz (MHz).** On-water cleanup operations are expected to use licensed marine VHF radio equipment for inter-vessel, ship-to-shore, or response personnel communications. Marine channel 16 is the international distress and hailing frequency. Marine VHF radios can also be used to warn other, non-response vessels about ongoing cleanup operations. Marine radios can be used for coordinating the cleanup operations, although UHF radios are also suitable for this purpose.

- **VHR-AM Aircraft Radio (118-136 MHz).** These VHF frequencies are used for ground-to-air communications, although most aircraft can also monitor VHF Marine and many UFG channels. Ground-to-air communications are very important for relaying surveillance information, as well as coordinating the transport of equipment and personnel.
- **UHF (454/459.000 MHz).** UFR radio systems are typically used for land-based operations, although they are also acceptable for marine use. UHF radios are often limited to just a few frequencies or channels that are preset into the units. Most UHF radios are 3- or 6- (but can be up to 16) channel models with the actual frequencies dependent on the license of the particular facility or company.
- **HR Single Sideband Radio (2-20 MHz).** For communication over long distance at sea and in undeveloped areas, operators may consider obtaining high-frequency single sideband voice radio equipment. Radio propagation by this mode changes widely over daily and yearly cycles, and is strongly influenced by changes in solar activity. Communications may be excellent with a station 50 km away at a given time, and barely audible a few hours later.
- **INMARSAT Satellite.** INMARSAT systems can be installed on vessels or at remote locations and, where approved for voice and facsimile communications to standard telephone lines, almost anywhere in the world. The associated costs are high, but these systems can be invaluable in areas where other forms of communication are unavailable or inconsistent or facsimile transmissions are critical.
- **MSAT.** MSAT is a satellite system based on the world's most powerful commercial mobile satellite. MSAT has extended mobile telephone, fax, and data communications to all of North America and up to 400 km offshore in coastal water.
- **Paging Systems.** Pagers are one-way radio communication systems that enable persons within range of the paging system transmitter to be alerted or to receive a brief message.
- **700 Mhz.** Radio communication networks provide broadband wireless connectivity primarily in the Prudhoe Bay area westward to Alpine, including coverage offshore in short distances (<10 miles).

The communications equipment maintained on site at the drill rig is listed below. With repeaters installed across the North Slope, response radio coverage is provided from National Petroleum Reserve Alaska (NPRA) to Badami. The range for each repeater is approximately 30 to 50 miles, depending on topography and, to some extent, on weather. Additional repeaters may be located throughout the proposed exploration area to assure that coverage is available to the drill site. In addition, an on-site satellite system will provide a communications link with off-site resources, agencies, and company contacts.

AES communications systems and equipment will be compatible with ACS systems.

Rig Communication

In order to ensure radio communication between the North Slope Spill Response Team (NSSRT) radio network at Deadhorse and the proposed exploration drill sites, ACS will have operational repeaters in place on board the rigs unless it is determined that existing systems can reach these distances without repeaters. ACS will strategically preposition a repeater and portable communications tower for use during each summer drilling season, where needed. A complete list of communication repeaters (mobile and portable) is found in the ACS *Technical Manual,* Tactic L-5.

Communication onboard the rigs will initially use VHF radios, tied to a repeater in the ACS wide-area VHF radio network as Channel OS-33.

- Once the rigs are on site, satellite communication will be available. The rigs will have a Ku Band satellite communication package functioning as the primary means of communication for telephone lines, facsimile lines, and data network access lines.
- In addition, the drill rigs will also have a back-up satellite cellular system. There will be multiple telephone and facsimile lines for the drill rigs. Telephone numbers will be provided prior to spud.

Intercom System, *Frontier Discoverer*

Barkway intercom system units are located in mud utility, bulk, mechanical and electrical areas, drill floor, and manager's office. The systems are equipped with priority override speed calling and two independent speech paths. The systems will be interrupted temporarily by a page or an alarm from a tone generator. Another system, Vingtor, links the rig pump room, radio room, and control room to the rig pump room, control room, and stairwell, and operates independently of all other systems. This is a hands-free, talk back system.

Intercom System, *Kulluk*

Barkway intercom system units are located in mud utility, bulk, mechanical and electrical areas, drill floor, and manager's office. The systems are equipped with priority override speed calling and two independent speech paths. The systems will be interrupted temporarily by a page or an alarm from a tone generator. Another system, Vingtor, links the rig pump room, radio room, and control room to the rig pump room, control room, and stairwell, and operates independently of all other systems. This is a hands-free, talk back system.

Page and Alarm System, *Frontier Discoverer*

This system consists of camp and alarm system. The camp page has high- and low- level volumes (low for sleeping areas); however, in the event of an alarm or emergency page, the volume is increased to full. Tone generators in the control unit of the page system will provide three distinct tones for:

- General – Vibrato – percussive 816 Hz tone
- Combustible Gas – Yeow – 1260-600 HX – downward sweep in 1.6 seconds, and
- H_2S Gas – Hi-Lo – 780-600 Hz, alternately – 0.52 seconds each.

A console in the radio room is interfaced to the control unit with push-button control of appropriate page, alarm, and cancel functions. This console is also interfaced to fire panel and remote sensors with lamps to indicate fault conditions, as well as an auto/manual switch to allow for automatic gas alarms should the radio room be unstaffed.

All alarm tones, standard pages, and emergency pages are transmitted to the rig, camp, and rig via mixer-amplifiers installed in the equipment room in a rack with the page control unit. The rig mixer/amplifiers are installed in the stores room.

Page and Alarm System, *Kulluk*

This system consists of camp, MAT, and alarm system. The camp page has high- and low- level volumes (low for sleeping areas), however, in the event of an alarm or emergency page, the volume is increased to full. Tone generators in the control unit of the page system will provide three distinct tones for:

- General – Vibrato – percussive 816 Hz tone
- Combustible Gas – Yeow – 1260-600 HX – downward sweep in 1.6 seconds, and

- H_2S Gas – Hi-Lo – 780-600 Hz, alternately – 0.52 seconds each.

A console in the radio room is interfaced to the control unit with push-button control of appropriate page, alarm, and cancel functions. This console is also interfaced to fire panel and remote sensors with lamps to indicate fault conditions, as well as an auto/manual switch to allow for automatic gas alarms should the radio room be unstaffed.

All alarm tones, standard pages, and emergency pages are transmitted to the rig, camp, and rig via mixer-amplifiers installed in the equipment room in a rack with the page control unit. The rig mixer/amplifiers are installed in the stores room.

Communication and Navigation Equipment, *Frontier Discoverer*

The *Frontier Discoverer* has the following communication and navigation equipment installed:

- Mitel SX-20 telephone exchange with seven outgoing trucks and associated locals
- Four each, VHF, FM radio telephone, Raytheon Ray-55
- VHF air-to-ground radio, WCS300
- Nondirectional beacon, Wilcox 485
- Two each, high frequency Single Sideband (SSB) – Motorola Triton
- Radar transponder – Vega 367X
- Rapifax machine
- Satellite dish for TV c/w modulator, amplifier, intercamp wiring, VCR
- Walkie-talkies (15)
- 2182 Marine Emergency Watch receiver
- Class 1 and Class 2 EPIRB
- Lifeboat radio and VHR crash boat radio
- Weatherfax receiver – Furuno
- Telecommunications currently supplied by Alaska Telecommunications
- Two each, 25 kilowatt (kW) Decca radars; one mounted on top of the camp, the other mounted on top of the derrick
- Satellite navigator – Magnavox 4102
- Three VHF radiotelephones – Raytheon Ray-78; one installed in each crane
- One Sperry SR120 gyro compass
- Pantenna/amplifier entertainment system

The *Frontier Discoverer* will have the following communication equipment installed:

- Three independent paging systems for all three cranes

Communication and Navigation Equipment, *Kulluk*

- ITT 3100 PBX
- Four each, very high frequency, FM radio telephone, Raytheon Ray-55
- VHF air-to-ground radio, WCS300
- Nondirectional beacon, Wilcox 485
- Two each, high frequency SSB – Motorola Triton
- Radar transponder – Vega 367X
- Rapifax machine
- Satellite dish for TV c/w modulator, amplifier, intercamp wiring, VCR
- Walkie-talkies (15)
- 2182 Marine Emergency Watch receiver
- Class 1 and Class 2 EPIRB
- Lifeboat radio and VHR crash boat radio
- Weatherfax receiver – Furuno
- Telecommunications currently supplied by Alaska Telecommunications with dual Ku Band stabilized systems as primary unit for phones, data, and fax
- Two each, 25 kW Decca radars; one mounted on top of the camp, the other mounted on top of the derrick
- Satellite navigator – Magnavox 4102
- Three VHF radiotelephones – Raytheon Ray-78; one installed in each crane
- One Sperry SR120 gyro compass
- Pantenna/amplifier entertainment system

The *Kulluk* will have the following communication equipment installed:

- Three independent paging systems for all three cranes

Patch Number 1 and Patch Number 2

HF radio can be patched to any world-wide telephone. When using these systems, explain to the other party that they have to wait for sender to stop transmitting before they try to talk or their conversation will be blocked.

1.4.3 Equipment Maintenance

Communications equipment will be periodically tested and maintained according to the following schedule:

- Monthly:
  - All rechargeable batteries will be tested and recharged.
  - All radio and electronic equipment will receive an operational test to ensure that the equipment is working.

- After Use:
  - All communications equipment used in actual spill response operations will be inspected, cleaned, and tested before being returned to storage.

1.5 DEPLOYMENT STRATEGIES [18 AAC 75.425(e)(1)(E)]

The first twelve hours of the response will be manned by the AES and response vessel oil spill personnel on-site. Both the Oil Spill Response Vessel (OSRV) and Oil Spill Recovery Barge (OSRB) have sufficient trained personnel to provide containment and recovery for the initial operation period. The succeeding operation period may be manned by response personnel from the response vessel located at the other site or by transporting trained AES or ACS personnel via helicopter or small vessel from a land or vessel based staging area.

The AES oil spill personnel designated to the OSRB will be accommodated on either the drilling vessel, or its support fleet in the immediate surrounding area. In the event of an incident at the other drilling location, response personnel will be available for prompt and immediate transfer to that site in order to provide crew relief within the first twelve hours of the spill response. These personnel may be transported via helicopter from the heli-decks located on the rig or its supporting vessels or may utilize small vessels or workboats for transport.

The AES oil spill personnel designated for the OSRV will reside onboard the OSRV. These personnel are available to respond rapidly to an on-site emergency. The OSRV personnel are also available to transfer to the icebreaker in the area and may be transported via helicopter to the other drilling location to provide crew relief to the OSRB combination within twelve hours. Should certain conditions exist that limit helicopter operations, the OSRV crew may remain onboard and continue the transit to the other drilling location. These personnel may also be transported via helicopter from the heli-decks located onboard either of the supporting vessels or may utilize other small vessels or workboats for transport.

The remaining mobilization of staff to support the oil spill response effort (as indicated in Table 1-17), will be progressively mobilized as follows:

- From existing call-out arrangements under ACS, for North Slope Spill Response Teams (72 hr duration), from ACS Auxiliary Contract Response Teams, and from the North Slope Village Response Team (with members from Barrow, Atkasuk, Nuiqsut, and Kaktovik),
- AES staff off-rotation outside the North Slope operating area (subject to 70% availability for planning purposes),
- Other AES staff and contractors,
- Other qualified staff mobilized from within the Royal/Dutch Shell Group in the US and abroad.

1.5.1 Transport Procedures [18 AAC 75.425(e)(1)(E)(i)]

Actual response and mobilization times will vary depending on a variety of factors, such as weather, personnel safety, and wildlife considerations. During adverse weather conditions that prohibit the transport of equipment, personnel, and other resources to the spill site, spill response will be conducted solely by on-site personnel and equipment.

The estimated response time from discovery of a spill at the drill site to the deployment of equipment varies depending on the incident causing the spill, the size of the spill, time of year, logistical support, and available information.

TABLE 1-8
TRANSPORTATION OPTIONS

MODES OF TRANSPORTATION	SEASON		
	OPEN WATER	BREAK-UP/FREEZE-UP	WINTER
Helicopters	X[1]	X[1]	X[1]
Fixed-Wing Aircraft	X[1]	X[1]	X[1]
Vessels	X	Conditional[2]	--
Vehicles/Heavy Equipment	--	--	Conditional[2]
Heavy ATV	--	--	Conditional[2]

[1] Weather dependent
[2] Dependent upon ice conditions

Pre-staged Equipment

Access to pre-staged equipment and supplies to handle minor operational spills will be kept in a state of readiness on each of the drill ships. Each drilling vessel will also have one of Shell's primary OSRVs on standby, on location, and ready to assist with any overboard release.

Shell and ACS will determine whether additional equipment should be pre-staged along the shoreline to support shoreline response as described in Section 1.6.12. If necessary, connexes packed with containment and recovery equipment will be pre-staged at strategic locations along the shoreline between Prudhoe Bay and Barter Island, and would be routinely inspected throughout the drilling season to ensure they are secure and ready for deployment in the event of an emergency.

Access to shoreline protection and nearshore response equipment is provided by ACS vessels.

Air Access

The drilling vessels can accommodate helicopter operations. Air operations can be limited by weather conditions, as discussed in Section 3.4.

Fixed-wing aircraft can transport personnel and equipment to gravel airstrips located at Badami (5,100 ft), Bullen Point (5,100 ft), Kavik River (5,000 ft) or Kaktovik (4,800 ft). Special permits are required to access the Bullen Point airstrip that will be coordinated with the U.S. Air Force as needed. These airstrips provide coastal access and can serve as logistical hubs for shoreline protection or cleanup efforts. Some upgrades such as lighting provisions may be required. The Badami and Bullen Point airstrip locations can be viewed on ACS Map Sheets 91 and 101 respectively.

1.5.2 Notification and Mobilization of Response Action Contractor [18 AAC 75.425(e)(1)(E)(ii)]

Section 1.1 of this C-Plan describes immediate response and notification actions, including notification of AES and ACS. While ACS is mobilizing personnel and equipment to provide spill response support, Shell

personnel will determine safety procedures, notify government agencies and other Shell personnel, and proceed with source control measures. In addition, if safe to do so, AES response personnel will deploy on-site spill containment equipment.

1.6 RESPONSE STRATEGIES [18 AAC 75.425(e)(1)(F)]

The following subsections provide information about response to potential oil spill and related incidents arising from Shell's exploratory drilling program.

The narratives provided in these sections complement the information found in Section 1.6.13, Spill Response Scenarios. Where practicable, project-specific details, including oil trajectories, have been incorporated based on the actual prospects to be drilled during the 2007 season.

1.6.1 Procedures to Stop Discharge [18 AAC 75.425(e)(1)(F)(i)]

Procedures to stop the discharge are discussed in Section 1.6.3 Blowout Control/Relief Well Plan; Section 2.1.7, Blowout Prevention and Emergency Shutdown; Section 4.2, Source Control; Table 4-1, Best Available Technology (BAT) Analysis Well Blowout Source Control; and in the Spill Response Scenarios listed in Section 1.6.13.

1.6.2 Fire Prevention and Control [18 AAC 75.425(e)(1)(F)(ii)]

In the event of a spill, all sources of ignition will be eliminated, if safe to do so. A standard Site Safety Plan will be used in the event of a major oil spill. This includes assessing and establishing exposure control zones into which appropriately trained and equipped personnel may enter.

If a fire occurs, it will be controlled as much as possible with fire monitors on rig and supporting vessels.

The *Frontier Discoverer* contains fire and lifeboat alarms, fire fighting and wash down systems:

- Alarm systems include vessel mounted gas detectors located on the rig floor, upper shale shaker, mud pit room and mud pump room, with a monitoring panel mounted in the radio room.
- An emergency shut down system for the ship is located on the rig floor. The main engine emergency shutdowns are located on the bridge and in the Emergency Response Room.
- Fire and wash down systems include two centrifugal, 300 gpm fire pumps, one centrifugal 300 gpm emergency fire pump, and a number of fire hydrants located throughout the rig.
- The vessel is equipped with fixed CO2 fire extinguishing systems to cover the propulsion room, generator room, control room, paint locker and emergency generator room.
- Fire fighting foam systems comprise two monitors, foam tank and separate pump for Heli-Port protection.

1.6.3 Blowout Control/Relief Well Plan

Shell has taken significant precautions to minimize the potential for a loss of well control. Section 2.1.8 describes the four layers of preventive and recovery measures used to minimize spill potential during drilling operations.

In the unlikely event that well control is lost despite these precautions, Shell will immediately mobilize emergency response personnel and equipment. Shell will also consult a well control specialist such as Wild Well Control for the intervention and resolution of a well control emergency.

Surface Control Options

If well control is lost, every effort will be made to regain well control using dynamic surface control measures. Historically, these measures of regaining control have been rapid and effective.

However, uncontrolled flow at the surface presents a safety hazard. Safety procedures are employed to protect personnel, the environment, and equipment. A site assessment is conducted, safe access and work plans are created, and uncontrolled fluids are diverted for collection to create a safe working environment and to minimize pollution.

Although the specific surface control methods used will depend on the situation, potential mechanical surface control methods include the following:

- Natural bridging;
- Pumping mud, plugging material, and/or cement down the well to kill it;
- Replacing the failed equipment if control was lost due to equipment failure.

Relief Well

As described in Section 2.1.8, Shell does not rely on relief well drilling as the primary method of surface well control, but rather applies a rigorous multi-layer well control management system that has proven successful in preventing escalation of a well control incident to a blowout situation. These layers include planning and risk identification, early kick detection and kick response procedures, and installing mechanical barriers. These measures result in an extremely low probability of an uncontrolled well release, but in the event this did occur, the drilling of a relief well is the final tool for regaining well control.

In the scenario developed for this contingency plan, the drilling vessel originally on site attempts to stop (or slow) the blowout by pumping mud and/or concrete downhole. Should these efforts fail, the drilling vessel pulls away from the blowout location in order to support safe recovery operations from a relief well site. As a precautionary measure, relief well preparation operations are initiated in parallel with the implementation of surface control methods. Unless it is damaged, this same drilling vessel will then commence relief well drilling. Where the original on site rig is damaged, Shell's second rig will be used to drill the relief well.

The general strategy for drilling a relief well is to drill a well to intersect the blowout well. Then, drilling fluid or cement is circulated from the relief well to the original wellbore at sufficient rates and weight to stop formation fluid from flowing into the original wellbore, bringing the well under control. Finally, both wells are properly plugged and abandoned.

A relief well in this situation would have the following general characteristics:

- No mud line cellar
- No formation evaluation at the casing points
- Kill fluid as well as an additional wellhead and additional surface casing and other casing, drill pipe, mud materials, and cement would be in place onboard both Shell-operated rigs
- A detailed Relief Well Design is submitted to MMS as part of the Application for Permit to Drill.

Relief Well Locations

The optimum location for a relief well depends on several factors, including the depth and direction of the wellbore, personnel safety, and weather conditions. The location of the relief well is selected so that it can be drilled in the most efficient manner practicable.

Relief Well Drilling Rig and Equipment

As mentioned above, the relief well could be drilled by the on-site rig, or if necessary, by the second Shell-operated drilling vessel in the Beaufort Sea, which could be mobilized to drill the relief well from its position on an adjacent prospect (see Section 1.6.13). Given the relatively benign anticipated well conditions and subsurface well control at the Beaufort Sea locations covered by this plan, and given the risk reduction actions in place (See Section 2.1.8), Shell believes that a prudent operator could conduct a Beaufort drilling campaign using a single drilling rig. However, based on its prospect portfolio in the Arctic, Shell has committed to a two-rig drilling campaign, which provides an additional mitigation effort in the form of a backup rig to drill a relief well, if required. As stated in the Response Scenario Table 1-12, it is Shell's expectation that this second rig will be operating offshore in the Alaskan Arctic while exploratory drilling is underway in previously un-penetrated hydrocarbon formations below the surface casing point.

In the event of a blowout, the second drilling vessel would immediately cease its then current operations and begin redeploying to the blowout site to be available if required. It is important to note when considering potential relief well operations, that based on past seasonal ice conditions and active ice management experience, it is very likely that the drilling season could be extended into November. This is particularly relevant in the case of relief well operations and when considering the use of the proven ice-tolerant Kulluk drilling vessel.

While each drilling vessel will carry surface casing and wellhead equipment for a relief well, contingency plans have been established to augment existing drilling equipment (drill pipe, additional casing, cement, and mud materials) and services, which will be drawn from Shell's operations support base in Deadhorse, greater Prudhoe Bay, or Tuktoyaktuk, Canada.

Relief Well Timing

The estimated total duration from the start of a blowout to well killing by drilling a relief well would be approximately 16 days for a relief well for the 8,000 foot TVD well and would be approximately 34 days for a relief well for the 14,000 foot TVD well.

Blowout Well Ignition

The decision to ignite a blowout will be made only after assessing the probability of implementing successful surface control, reviewing potential safety hazards, addressing pertinent environmental considerations, and obtaining necessary agency approvals. In order to save time a risk/benefit analysis will be completed by Shell, considering the full range of conditions where deliberate ignition could take

place. Placing human safety as the highest priority, Shell will consider the feasibility and benefits of igniting the blowout after all personnel, equipment, and vessels have been located at a safe distance from the surfacing oil and gas. Ignition equipment and procedures such as Heli-torch, hand-held igniters, and flares, will be located on-scene and ready for use. The Shell risk/benefit analysis will provide a checklist to facilitate a rapid assessment of the potential risks of exposure for personnel, equipment, and wildlife to the initial flash of combustible vapors, as well as the heat and combustion products from a sustained burn. Ignition and sustained combustion of vapors from the surfacing gas and oil could potentially result in a safer working environment for relief well operators and for responders attempting to contain and recover oil downstream of the blowout. A controlled burn would help eliminate dangerous vapors in the working vicinity.

Permits

In the event of a discharge due to the loss of well control, a series of federal, state, and local permits would be required to support the response effort. Permits will be needed to authorize construction of onshore support facilities if necessary (e.g., staging pads, temporary storage areas, and temporary water uses).

Federal approval would be required in the form of a Section 404/10 permit from the U.S. Army Corps of Engineers (COE) for placement of gravel in nearshore coastal waters. The COE has issued a Nationwide Permit No. 20, which authorizes placement of fill needed for cleanup of spilled oil. A request for this authorization would require approval from the Alaska Regional Response Team, and would typically be approved very rapidly, assuming the team is in agreement with the overall cleanup strategy for the spill event.

In addition to this federal permit, State of Alaska and North Slope Borough permits would also be required. If all other surface control measures fail and it becomes necessary to drill a relief well, Shell will obtain the proper State of Alaska Permit to Drill (APD) prior to drilling, as per 20 AAC 25.005. As part of the overall North Slope oil spill preparedness program, ACS holds a series of permits authorizing a variety of cleanup-related activities, including bird and mammal hazing and mammal stabilization.

1.6.4 Discharge Tracking [18 AAC 75.425(e)(1)(F)(iv)]

Discharge tracking is discussed in the response scenarios in Section 1.6.13.

Oil movement is tracked using a combination of visual observations and remote sensing techniques. Upon initial notification of the blowout, the Kuparuk twin Otter with forwa4rd looking infrared radar (FLIR) o alternative aircraft with Synthetic Aperture Radar (SAR) would be deployed (depending on availability and weather conditions). See ACS *Technical Manual,* Tactics T-4 through T-7.

Response vessels also deploy buoys with transmitters. Both systems are capable of real-time tracking of the leading edge of the oil. The tracking buoys are equipped with a transmitter that can be monitored by a receiver located either on a boat or aircraft. Oil location information is digitized and transferred to the Incident Management Team for response planning and trajectory modeling.

In the event of a spill, trajectory models will be based on observed and modeled currents, wind speed, and direction. Vector addition and trajectory modeling are used to forecast oil movement.

1.6.5 Protection of Sensitive Areas [18 AAC 75.425(e)(1)(F)(v)]

Environmentally sensitive areas and areas of public concern include cultural resource sites, public use areas, Native allotments, and bird nesting areas. See Section 3.2 for discussion of the local environment.

The NOAA Environmental Sensitivity Index Maps, ACS Atlas Maps, and the North Slope Subarea Contingency Plan are used to identify areas of major concern. See ACS Map Atlas sheets 86, 89, 98, 99, 100, and 105. A shoreline cleanup plan is prepared for approval by the Unified Command and the State Historic Preservation Officer.

Based on trajectory calculations and oil tracking, barrier islands are identified as the first landforms that may be impacted by oil, followed by the salt marshes and inlets adjacent to the Kadleroshilik River. Protection sites identified in these areas are provided protection with exclusion or deflection booming when little or no ice is present. If drifting ice is present, and the use of booms is not feasible, oil collecting naturally among the ice will be monitored. Recovery efforts for these natural collection sites include the use of small skimming systems, using shallow-draft boats. Accumulations may also present an opportunity for limited burns at or near the shore. In the case where land-fast ice conditions are present, sensitive shoreline resources may be afforded protection from the natural ice barrier.

As oil spill response progresses, priorities for protection may change based as weather, sea state, oil condition, hours of daylight, and other factors.

A new Shoreline Clean-up Plan will be developed and submitted to the Unified Command. Oil and oiled ice will be monitored to the extent possible throughout the spill, and for as long as oil is believed to be present. Should oil persist near the shoreline, after winter recovery operations are complete, these areas will be marked and monitored as the ice begins to melt during breakup. Shoreline specialists and clean-up teams will use the monitoring data to plan and implement removal (and possibly, combustion) tactics within those regions with oil.

1.6.6 Containment and Control Strategies [18 AAC 75.425(e)(1)(F)(vi)]

Containment and control strategies are discussed in the scenarios. AES is responsible for initial on-site personnel and equipment described in the scenarios. An OSRV/OSRB is staged with each of the Shell drilling vessels employed for the exploration program. Each OSRVs is outfitted with sufficient work boats, boom, skimmers, and other necessary response equipment to respond to an uncontrolled well blowout. Containment boom and equipment can be deployed from each OSRV. The OSRV collocated with the drill ship operating in the Sivulliq lease site shuts down drilling and departs that site as quickly as possible upon notification of the blowout. The backup OSRV arrives at the blow out within 24 hours to support containment and recovery operations. Specific tactics are described in the scenario in Section 1.6.13. See ACS *Technical Manual,* Tactics B-1, B1A, B-2 through B-7, C-12 through C-14, and L-2.

ACS has the capabilities to mount an effective, immediate response for the containment and recovery of oil in threatened nearshore waters and to prepare for the protection and cleanup of impacted shorelines. ACS will also provide personnel and equipment to supplement the primary offshore response operations. AES will be responsible for all offshore response and will use personnel and equipment identified in the AES *Response Tactics Manual*. ACS will lead the containment and control efforts in the nearshore and shoreline environments. They will use personnel and equipment identified in the ACS *Technical Manual,* as well as oil spill equipment possibly stored at pre-staged shoreline locations.

As described in the scenario, ACS Shoreline Protection Task Forces mobilize to deploy exclusion booms, if needed, at protection sites on Flaxman Island, at protection sites south of Tigvariak Island, and at protection sites adjacent to the Kadleroshilik River. These sites are prioritized and boomed in order of proximity to the spill. ACS dispatches additional Shoreline Protection Task Forces to Barter Island to assist Village Response Team personnel in deploying vessels, boom, and other equipment. The protection sites, located in Camden Bay, are prioritized by aerial observers on site, and through trajectory analyses performed by NOAA and The Response Group.

Four teams, traveling by workboats and/or airboats from the Prudhoe Bay area, each place boom in the quantities described in the ACS *Technical Manual* Map Atlas.

The summer scenario described in Section 1.6.13 addresses Shell's plans to respond to a blowout during open-water conditions (August 1–30). It is recognized that ice incursions can occur at any time during the open-water season, and that a period of unexpected cold-air temperatures can result in the formation of new ice (typically grease ice and the formation of thin continuous layers of ice). Any continuous layers of ice, and even low concentrations of individual ice cakes or floes (such as, 1/10 to 2/10 concentrations), can fill containment or deflection booms, prevent oil from accumulating in large pools, and block the flow of oil toward a recovery device. As these conditions develop, the efficiency of physical containment and recovery tactics will be reduced.

As indicated in Response Strategy 1 in Section 1.6.13 (with varying ice conditions), response strategies and specific tactics will be modified to accommodate the challenges of working with a variety of potential ice conditions. If ice concentrations threaten the structural integrity of equipment or prevent oil from being deflected or effectively contained, the offshore response teams will use shorter outrigger/boom extensions in conjunction with skimmers in order to maneuver around large ice cakes while attempting to access smaller pockets of oil.

As ice conditions persist, recovery operations will continue with rope mop skimmers and other small over-the-side skimmers to access oil trapped next to or within heavier ice concentrations, until the conditions threaten the safe and effective use of vessels. At this point, all physical removal tactics will cease, and

clean-up operations will turn to the elimination of oil pockets through the use of controlled burning, as feasible. ACS Tactics B-3 through B-7 for open water and solid surface burning will be considered and modified as appropriate to allow for the controlled burning of oil herded against large ice floes, trapped within heavy concentrations of ice, or accumulated in thick layers against shorelines or land-fast ice. Burning can be accomplished without placing personnel and vessels at risk with the use of Heli-Torches suspended from helicopters.

At the blowout site, the potential for oil elimination using combustion may continue into periods of light to moderate ice concentrations (including new, solid ice layers) as the oil and gas released from the blowout lift and crack ice layers and leave oil exposed on or between ice cakes/floes. A Heli-torch can be flown, day or night, and used to ignite the oil and vapors directly over the blowout. During early freeze up, ice-breaking vessels or barges upstream of the blowout can enhance the efficiency of this operation by keeping large ice floes from moving in over the surfacing oil and gas where they could potentially extinguish the flames. These vessels or barges may also be positioned at a safe distance upstream of the blowout to deflect ice and create a temporary, relatively ice-free path and potentially enhancing the combustion process. Oil that escapes the burn at the surfacing plume will likely be herded by wind to one side or the other of the cleared path, allowing oil to accumulate for additional burning downstream.

Any oil that avoids containment, recovery, and/or combustion during freeze-up conditions will quickly be locked up beneath and on the ice, and eventually incorporated within ice and snow. Proven techniques for the removal (or mining) of oil from within or below ice (See ACS Tactics C-11 and C-12) may be feasible where it is safe to access and work on a stable ice layer. In other ice regions, particularly in the shear zone (typically 10- to 20-meter depths), it may be impractical and unsafe to access the oiled zone because of its movement and extensive ridging and rafting of the ice.

Shell, its Alaska and International Response Teams, and its contracted support from AES and ACS, are all prepared to conduct extensive monitoring and tracking of any oil that is released to the Beaufort Sea and which is unrecoverable until spring. Such tracking of oiled ice may involve the release of 5 Metocean buoys (stored on each rig) and Arctic drift buoys with extended transmission capabilities, to be released at or near the spill source. Other markers may involve passive systems such as radar reflectors and brightly colored floats and flags. Together with daily weather recordings, satellite images and ice-movement modeling activities, the continued release and tracking of buoys will enable oceanographers and surveillance specialists to monitor changes in the location, speed and direction of oiled ice. While the nature and location of stable, land-fast ice can vary substantially from year to year, the seasonal pack ice zone, although mobile, can also experience long periods of little or no ice motion. During these periods oiled ice would remain relatively close to the spill source and be easier to track.

Oil released beneath a stable ice cover would soon be encapsulated as new ice forms around and beneath the oil. Depending on the concentration of the oil and the thickness of ice and snow, the monitoring of oiled ice could include Shell's Global Solutions Light Touch system (developed for methane detection from oil in or under ice), the use of Ground Penetrating Radar (showing great promise in recent tests by MMS, Statoil AS and Alaska Clean Seas), and the use of laser fluorosensors (showing considerable potential for detecting and mapping oil).

As longer periods of light occur and the ice begins to melt and weaken, the heavier deposits of oil beneath and within the ice will begin to move through brine channels and accumulate in melt pools at the surface. These pools will be easy to detect, they will contain oil that is nearly as fresh as when the pools were encapsulated, and they will likely remain concentrated enough to support combustion. Any oil released as fine droplets and widely dispersed will remain within the ice until the ice melts down to expose it. These droplets will eventually surface and be herded by wind into pockets of oil that can

potentially be ignited. Aerial ignition will continue well into the breakup period, as conditions allow, until it is safe to operate small skimmers in and around ice cakes and floes. As the ice rots and breaks into smaller pieces, regions of open water will appear, allowing larger containment and recovery operations to begin. Every opportunity will be used to contain and recover oil and burn residue before it can reach shorelines and other sensitive habitats.

1.6.7 Recovery Strategies [18 AAC 75.425(e)(1)(F)(vii)]

Recovery strategies are discussed in the scenarios and reference the ACS *Technical Manual* (Refer to Tactics R-16, R-20, R-32A, and R-32B).

Due to safety concerns, operations will be restricted or limited to appropriate distances from the blowout source. This statement does not indicate or imply a complete prohibition of activities such as containment and recovery close to the blowout. Personnel safety is Shell's primary concern. The On-scene Safety Officer provides access zone information and determines personal protective equipment (PPE) requirements. Access to the blowout site is carefully controlled. Monitoring protocol is established by the On-scene Safety Officer to ensure personnel protection. Recent spill recovery events and information provided to ADEC show that containment, control, and recovery operations can take place in areas near a blowout, as long as conditions are safe for workers.

Primary response is provided by equipment stationed in the vicinity of each drill rig. This equipment includes an OSRV or OSRB with a minimum 12,000-bbl storage capacity, equipped with two brush skimmers; two 34-foot work boats; mini-barges, and open-ocean containment boom and fire boom. The tactics used for the positioning of oil recovery vessels at the blowout site are described in the scenarios. The on scene OSRV/OSRB recovers oil throughout Day 1 until the second OSRV/OSRB (e.g., *Arctic Endeavor* or NAS 235) arrives on site within 24 hours. The *Arctic Endeavor* is equipped with storage tanks that can hold greater than 16,000 bbl of recovered fluids. In order to set up a consistent 24-hour rotation cycle with the other OSRV (one skimming while the other transits and lighters recovered oil), a conservative daily storage use of 12,000 bbl is used for the *Arctic Endeavor* for planning purposes. The *Endeavor* will also hold two brush-skimmers, four 34-foot work boats, one 47-foot skimming vessel (with built-in brush skimmers), mini-barges, and open-ocean containment boom and fire boom. When the *Endeavor* is on location recovering oil the other OSRV proceeds to the backup bulk storage tanker to transfer its recovered fluids. The total transport and set-up time of about 2 to 3 hours before and after lightering, together with the offload time of approximately 6 to 8 hours, allows either of the primary response vessels to complete their lightering and transit activities and return to support the other OSRV/OSRB before it fills its onboard storage tanks.

The time to fill each OSRV (using 12,000 bbl as a nominal storage capacity) is estimated by assuming that all of the oil released can be recovered; it is emulsified through the recovery and pumping process to 35 percent water-in-oil (using an emulsification factor of 1.54 as discussed with ADEC in October 2006), with an additional 20 percent of the blowout flow rate retained (after decanting) as free water, then all fluids (emulsion and free water) will fill the OSRV at a rate of nearly 400 bbl/hour. The 12,000-bbl storage capacity would therefore be reached in approximately 30 hours. It is recognized that no recovery operation would collect "all of the oil released; however, for planning purposes, the "Time-to-Fill" is based on the largest volume flow rate of oil/emulsion/water that could conceivably reach the skimming vessel.

A 513,000-bbl tanker will be centrally located not more than 60 nm from each drilling location to begin mobilizing immediately in the event of a spill. The tanker arrives at the blowout and is ready to accept recovered liquids in 14 hours.

For planning purposes, the scenario assumes that 10 percent of the 5,500-bopd discharge escapes the primary offshore recovery efforts at the blowout. The remaining 550 bopd continues to drift to the west, driven by prevailing winds and currents. ACS skimming vessels with mini-barges, dispatched from Prudhoe Bay, intercept the oil as described in the scenario. For the purposes of the scenario, it is assumed that half of the oil encountered in the nearshore environment is not recovered, leaving about 275 bopd to migrate to the shoreline.

Shoreline recovery operations are staffed by ACS. The scenario describes the mechanics of the recovery tactics. ACS task forces set up and maintain multiple teams along the shoreline to recover oil. For planning purposes, each task force maintains five teams that deploy boom to intercept oil moving along the shoreline, a small skimmer, and fast tanks or bladders set up on the beach to hold the recovered liquids or oily waste and debris. The tactical units will have two 59-bbl fast tanks allowing for up to 1,180 bbls of total fluid or oily waste storage along the shoreline before the waste is ready to be transported to Prudhoe Bay infrastructure for disposal.

Shell will negotiate a procedural agreement with either the Greater Prudhoe Bay Unit or Kuparuk River Unit for the processing and disposal of oil spill recovered fluids transported to Prudhoe Bay by ACS mini-barges. Recovered oil received in Prudhoe Bay will be handled in accordance with ACS disposal tactics D-1 through D-5.

1.6.8 Lightering, Transfer, and Storage of Oil from Tanks [18 AAC 75.425(e)(1)(F)(viii)]

Lightering, transfer, and storage of oil from tanks are discussed in the ACS *Technical Manual*, Volume 1 and in the AES *Response Tactics Manual*.

Liquids from the nearshore skimmer vessels are stored in mini-barges. Liquids and oily waste and debris recovered by the shoreline recovery task forces are stored in fast tanks or bladder tanks. Decanting follows Federal On-scene Coordinator (FOSC) plan approval. Stored liquids on mini-barges are off-loaded to the OSRV/OSRB or transported to Prudhoe Bay for processing.

AES will primarily use GT-A heavy oil transfer pumps to pump product from the mini-barges to the OSRV/OSRB. These pumps are modified, positive displacement pumps that are hydraulically driven, and have been specially developed for the pumping of extremely viscous products. The mini-barges are fitted with two suction lines (one each per tank) or the pumps can be submerged in the product via hold access hatches.

Recovered liquids received by the OSRV/OSRB will be retained on board until transferred to the Arctic storage tanker (refer to Section 1.6.9 below).

1.6.9 Transfer and Storage Procedures [18 AAC 75.425(e)(1)(F)(ix)]

Transfer and storage procedures are discussed in the ACS *Technical Manual,* Tactic R-22

Oil transfer from the OSRV/OSRB will be via permanently installed, hydraulically driven GT-A Heavy Oil Transfer Pumps. Each of the eight tanks (total 12,000 bbls capacity for all eight) on the OSRV are fitted with discharge pumps with each pump having a maximum pumping capacity of 115 cubic meters (m^3) per hour (718 bbls/hour) or a total of 920 m^3/hour (5,744 bbls/hour) total maximum pumping capacity. From the OSRV, recovered oil will be transferred from the manifold on the OSRV to the storage tanker.

As each OSRV nears capacity, the recovered oily liquids are transferred to the recovered oil tanker. Stored liquids are gauged and manifested.

1.6.10 Temporary Storage and Disposal [18 AAC 75.425(e)(1)(F)(x)]

Temporary storage of oil, oily waste, and debris recovered during a spill clean up may be provided by tanks located at the facility or on the OSRV/OSRB. The spill location or other logistical concerns may also require storage of oil, oily waste, and debris in smaller, more portable containers that can be brought to the scene via helicopter, or small boats and mini-barges. See ACS *Technical Manual* Tactics D-1 through D-3.

Non-liquid oily wastes are classified and disposed of according to classification. Non-oily wastes are classified and disposed of accordingly.

At the time of the spill, the Operations Section Chief, in consultation with the Environment Unit Leader, determines the reuse, recycling, or disposal method best suited to the state of the oil, the degree of contamination, and the logistics involved in these operations. Application for agency approvals are completed before the determined method of disposal is implemented.

Disposal and processing of recovered fluids transported to Prudhoe Bay will be in accordance with ACS *Technical Manual* disposal tactics D1 – D5. Recovered fluids will be disposed of as per Ballot Agreements.

Recovered fluids stored onboard the Arctic tanker will be disposed of either at Shell Group refineries or other 3rd party processors, in accordance with Shell environmental policy, and relevant local laws and regulations.

Shell's waste management procedures are further described in Appendix D, Oil and Debris Disposal Procedures.

1.6.11 Wildlife Protection [18 AAC 75.425(e)(1)(F)(xi)]

Wildlife protection strategies are discussed in the ACS *Technical Manual*, Volume 1, Tactics W-1 through W-6. The primary objective is to protect wildlife by preventing birds and mammals from entering spill or containment areas. Containment areas will be monitored until USFWS and/or ADF&G determine that monitoring is no longer required. In general, wildlife protection strategies include, but are not limited to:

- Containment and controls to limit the spread of oil, and the area influenced by the spill and response options
- The drill rig has a marine mammal observer (MMO) on board at all times, which is considered the BAT for wildlife monitoring.
- Hazing of birds and mammals
- Capture and relocation of wildlife in direct threat
- Aircraft monitoring

Refer to Appendix E, "Wildlife Capture, Treatment and Release Programs, Beaufort Sea Oil Spill Response Planning" for further details.

Shell has developed a Bear (Polar and Grizzly) and Pacific Walrus Encounter and Interaction Plan to support its request for a Letter of Authorization from the U.S. Fish and Wildlife Service for Shell's proposed operations. As part of the Encounter and Interaction Plan, individual addenda have been developed for each project including drilling programs. The Letter of Authorization request is under review and a copy of the Letter of Authorization and the approved Encounter Plan will be available on all Shell Operations Facilities. Bear awareness training will be provided to all operations staff. Trained and certified bear guards will be deployed to support activities at risk of an encounter with Polar Bears. In the event of an accidental release that may impact shoreline resources, including Cross Island and Kaktovik, additional certified bear guards and security staff would be deployed to protect workers and Polar Bears. U.S. Fish and Wildlife Service staff may also be deployed to provide additional oversight and consultation in the event of a major response.

Hazing equipment will be stored at the Deadhorse warehouse and office building.

1.6.12 Shoreline Cleanup [18 AAC 75.425(e)(1)(F)(xii)]

Nearshore and Shoreline Response Plan

Tactics in the shallow and nearshore environments of the Beaufort Sea are best carried out using relatively small response boats (typically 20 feet to 40 feet). These shallow-draft fast-response boats are flexible platforms for conducting response activities in the changing conditions of the Beaufort Sea. The nearshore/shoreline response concept is to use smaller, more maneuverable vessels to conduct shoreline protection and cleanup operations, even in light concentrations of broken ice. The smaller vessels are better able to access pools of collected oil against an ice edge, move between ice cakes and floes, and respond more quickly to changing weather and ice conditions.

Experience has shown that small response boats also work well with relatively small, shallow-draft barges. ACS's fleet of mini-barges includes 249-bbl and two 225-bbl capacity barges. Barges of this size are ideal for easy maneuvering by small boats in thin ice and around ice cakes. Another advantage of the mini-barges is that, on their return to the recovery and cleanup area, they can be used as cargo platforms to carry equipment and supplies for the ongoing nearshore and shoreline operations.

Shell's offshore spill response program involves large OSRVs/OSRBs with high-volume recovery and storage capabilities. In addition, ACS has oil-spill-response vessels at Prudhoe Bay that can be deployed during open-water and limited broken or new-ice conditions over the broad region between Prudhoe Bay and Barter Island. Together with the mini-barges, these vessels can mount a significant response at those environmentally sensitive sites believed to be in the path of the oil's leading edge. Evaluations have been made of the likely spill trajectories that could result for a number of hypothetical spills from Shell's offshore operations. The oil spread and transport calculations suggest that shoreline exposures would not normally involve more than 3 or 4 high-priority-protection sites at a time during the first 24 to 48 hours of a spill. Because ACS vessels could travel from Prudhoe Bay all the way to Kaktovik in under 24 hours, there would be time to deploy boom at sensitive sites, and to intercept the leading edge of the oil before it reaches the shoreline.

Small boats can also be pre-staged and personnel heli-transported out to deploy boom. In most cases the water along the shoreline is so shallow that boom can be deployed by wading, and boats would not be needed.

Most of the tactics planned for nearshore and shoreline response are described and illustrated in the ACS *Technical Manual* shoreline Tactics SH-2, SH-3, SH-5, SH-6, SH-10, and SH-12; containment tactics C-

13 through C-16; and recovery tactics R-15 through R-18 and R-20. Some of these tactics, including slight variations to meet changing conditions along the shoreline, are detailed in Figures 1-3 through 1-8.

Sensitive Environmental Sites

In addition to the consideration of appropriate shoreline tactics and equipment, Shell has also undertaken a preliminary assessment of coastal areas that could be impacted from a major spill at Shell's drilling locations. These areas have been identified using a series of trajectory analyses and related timelines to ensure Shell's ability to protect the areas in a timely and effective manner.

The coastal area assessments consider the following factors:

- The potential for oil impact, and the nature and magnitude of possible oil retention (substrate, grain size, beach slope, and wave and tidal energy);
- The sensitivity of biological and cultural resources at risk;
- The type and amount of resources (personnel, boats, skimmers, and booms) required for shoreline protection and cleanup; and
- The weather and environmental conditions (prevailing and extreme events) that would most influence the performance of personnel and equipment.

An important step in this assessment process is the ranking of shoreline sensitivity. Ranking involves a careful evaluation of the relationships between physical processes, the nature and amount of oil that could reach a given shoreline, the shoreline type and substrate, oil fate and effects, and sediment-transport patterns. The intensity of energy expended on a shoreline by wave action, tidal currents (though small in the Beaufort Sea), and river currents directly affects the persistence of stranded oil. The need for shoreline-cleanup activities is determined, in part, by the speed with which natural processes might remove oil that is stranded on the shoreline, and the prioritization of areas where natural forces are relatively weak or absent (e.g., tidal flats and marshes). All of these processes and oil/shoreline interactions are used in the development and use of Environmental Sensitivity Index (ESI) values.

One of the best sources of environmental sensitivity ranking for the region of interest is the *Sensitivity of Coastal Environments and Wildlife to Spilled Oil, North Slope, Alaska, Atlas* (North Slope Atlas), supported by NOAA, Oil Spill Recovery Institute in Cordova, Alaska, CHADUX Corporation, ACS, and the MMS. The ESI rankings reflect the fact that areas exposed to high levels of physical energy generally have low biological activity and rank low on a scale of 1 to 10. Sheltered areas, however, commonly have high biological activity and rank the highest. The following list (extracted from the above referenced document) provides the ranking of shoreline habitats for the North Slope of Alaska, ordered by increasing sensitivity to spilled oil, with 1 being the lowest and 10 being the highest:

1A	Exposed Rocky Shores
1B	Exposed, Solid Man-made Structures
3A	Fine- to Medium-grained Sand Beaches
3C	Tundra Cliffs
4	Coarse-grained Sand Beaches
5	Mixed Sand and Gravel Beaches
6A	Gravel Beaches
6B	Riprap
7	Exposed Tidal Flats

8A Sheltered Rocky Shores and Sheltered Scarps in Mud and Clay

8E Peat Shorelines

9A Sheltered Tidal Flats

9B Sheltered, Vegetated Low Banks

10A Salt- and Brackish-water Marsh

10E Inundated Low-lying Tundra

Biological information about animal and plant species that are at risk from exposure to spilled oil or the cleanup process is also provided in the atlas. The species are divided into the following groups and subgroups:

- Birds (diving birds, gulls and terns, seabirds, shorebirds, and waterfowl);
- Fish;
- Marine Mammals (pinnipeds, polar bears and whales);
- Terrestrial Mammals (bears, caribou and musk ox), and
- Benthic Habitats (kelp).

The environmental sensitivity rankings, together with information about biological resources, sea ice, and human-use resources provided in the atlas, are important to the selection of areas identified as Priority Protection Sites. The North Slope Sensitive Areas Work Group, consisting of representatives from several federal, state and local government agencies and industry organizations, has worked with a wide range of experts to evaluate the environmental sensitivity rankings, and identify specific areas along the North Slope that should be recognized as Priority Protection Sites.

Figure 1-3 and Figure 1-4 present graphics of shoreline containment and protection and shoreline containment and recovery operations, respectively. Figure 1-5 shows shoreline cleanup and backwater protection.

Working closely with the North Slope Sensitive Areas Work Group, ACS has developed a Map Atlas, Volume 2 of their Technical Manual, which includes a comprehensive set of shoreline maps where Priority Protection Sites are identified (Figure 1-9). Shell has used the ESI rankings provided in the environmental atlas, along with the Priority Protection Sites indicated in the ACS *Technical Manual*, Volume 2, to consider the nature and extent of resources (vessels, barges, booms, skimmers, response equipment, and personnel) to provide a timely and effective nearshore and shoreline response.

For decades, ACS has carried out planning efforts, field trials, and training exercises involving the islands, mainland beaches, river deltas, and inland waterways and marshes over a broad region of the North Slope area. Most of these activities, and the Priority Protection Site analyses, have focused on the shoreline between Harrison Bay and Brownlow Point. Shell's assessment of possible spill trajectories from its planned drill sites reveal that shoreline impacts could occur east of the Priority Protection Sites currently identified in the ACS *Technical Manual*, Volume 2 (Figure 1-10). Using the ESI rankings in the North Slope Atlas, Shell has identified 23 additional sites that could be candidate Priority Protection Sites. Shell will work with ACS and other members of the North Slope Sensitive Areas Work Group to consider the selection of those sites (and possibly others) as official Priority Protection Sites for future updates of the ACS and other publications.

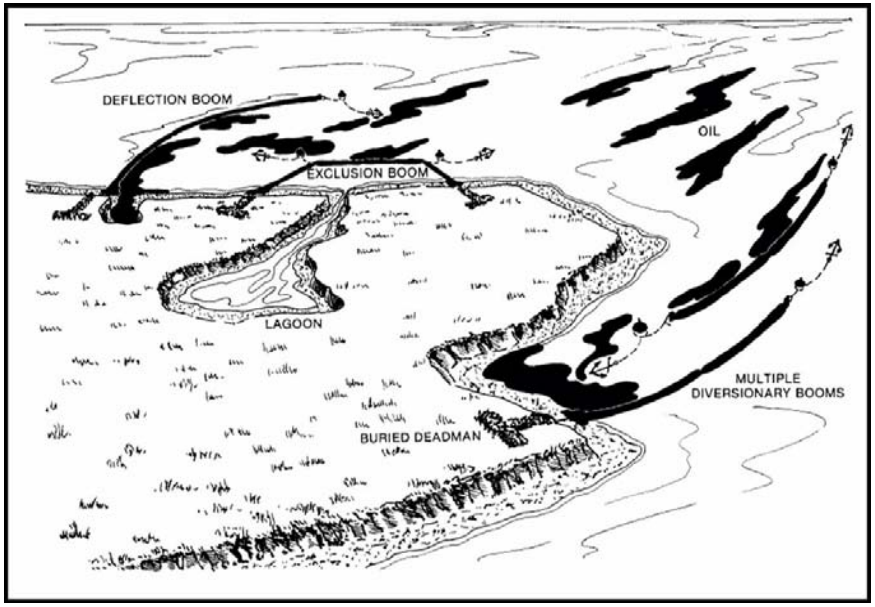
For planning purposes, Shell is using the proposed 23 candidate sites between Brownlow Point and Barter Island to ensure that all environmentally sensitive shorelines that could be exposed to spilled oil from Shell's operations are recognized and included in the current planning of nearshore and shoreline protection activities. See Table 1-9 for a list of the proposed priority protection sites. Plans are underway with ACS, NOAA, MMS, and others to participate in aerial surveys and site visits in the summer of 2007 to survey appropriate sites in this eastern portion of the Beaufort Sea. The goal is to designate official Priority Protection Sites and establish tactics, equipment, and personnel requirements for each site.

TABLE 1-9
SHORELINE PROTECTION ASSESSMENT FOR FLAXMAN ISLAND TO BARTER ISLAND

PROPOSED PRIORITY PROTECTION SITES	LATITUDE / LONGITUDE	LOCATION DESRCIPTION	PROPOSED TACTICS (AS PER ACS MANUAL)	ESTIMATED SHORELINE BOOM (IN FEET)
177	145 55' 0" 70 07' 0"	Covey	PS-46 C-13/14	800
178	145 40' 0" 70 05' 0"	Shoreline	PS-49 C-13/14	300
179	145 30' 0" 70 04' 0"	Shoreline	PS-49 C-13/14	300
180	145 28' 0" 70 03' 0"	Shoreline Covey	PS-46/49 C-13/14	600
181	145 20' 0" 70 02' 0"	Shoreline Point	PS-49 C-13/14	300
182	145 18' 0" 70 02' 0"	Shoreline Point	PS-49 C-13/14	300
183	145 18' 0" 69 59' 0"	Covey	PS-46 C-13/14	800
184	145 15' 0" 69 59' 0"	Shoreline and House	PS-49 C-13/14	300
185	145 0' 0" 69 58' 0"	Shoreline River Delta	PS-49 C-13/14	800
186	144 58' 0" 69 58' 0"	Shoreline River Delta	PS-49 C-13/14	1300
187	144 65' 0" 69 57' 0"	Shoreline River Delta	PS-49 C-13/14	800
188	144 40' 0" 69 57' 0"	Shoreline River Delta	PS-49 C-13/14	800
189	144 30' 0" 70 01' 0"	Shoreline	PS-49 C-13/14	300
190	144 28' 0" 70 02' 0"	Shoreline	PS-49 C-13/14	300
191	144 15' 0" 70 02' 0"	Shoreline	PS-49 C-13/14	800
192	144 10' 0" 70 02' 0"	Shoreline	PS-49 C-13/14	300
193	144 09' 0" 70 03' 0"	River Delta	PS-49 C-13/14	1300
194	144 07' 0" 70 03' 0"	River Delta	PS-49 C-13/14	1300
195	144 04' 0" 70 05' 0"	River Delta	PS-49 C-13/14	800
196	144 0' 0" 70 06' 0"	River Delta	PS-49 C-13/14	800
197	143 50' 0" 70 05' 0"	Covey	PS-46 C-13/14	800
198	143 49' 0" 70 05' 0"	Shoreline	PS-49 C-13/14	300
199	143 45' 0" 70 08' 0"	Shoreline Covey	PS-46/49 C-13/14	1300

While Shell's highest priorities will remain the prevention of oil discharge, and the safety of all personnel associated with the drilling program, the second highest priority will be the protection of the environment which will be achieved by containment, recovery, and/or elimination of as much oil as possible offshore before it can reach any of the sensitive resources and shorelines of the Beaufort Sea. Though unlikely, should a spill occur, Shell will have planned and implemented a nearshore and shoreline protection program with ACS, an Oil Spill Response Organization with a proven record of performance involving dedicated personnel and best available technology. The activities of ACS will involve multiple, high-volume elimination skimmers, ice-class vessels and barges, in a constant state of readiness to support each of Shell's offshore drill sites. The offshore and nearshore response teams will work closely with the North Slope Village Response Team to ensure that local knowledge of the environment is employed, including the possible staging of response equipment at key locations along the shoreline.

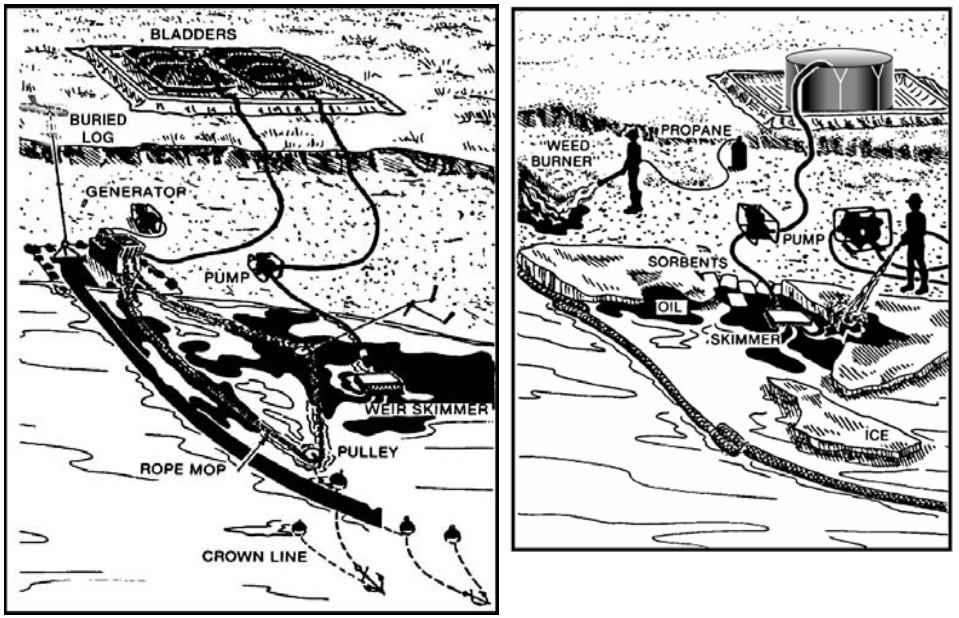
FIGURE 1-3
SHORELINE CONTAINMENT AND PROTECTION



Concentration of oil at natural and/or man-made collection sites and diversion of oil away from Priority Protection Sites.

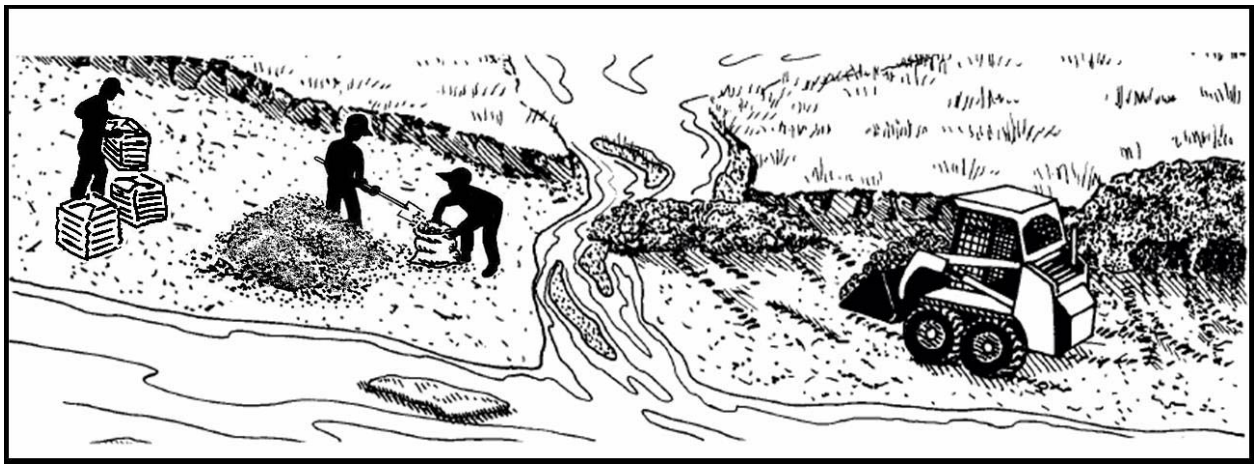
FIGURE 1-4
SHORELINE CONTAINMENT AND RECOVERY OPERATIONS

Open Water **Broken Ice**



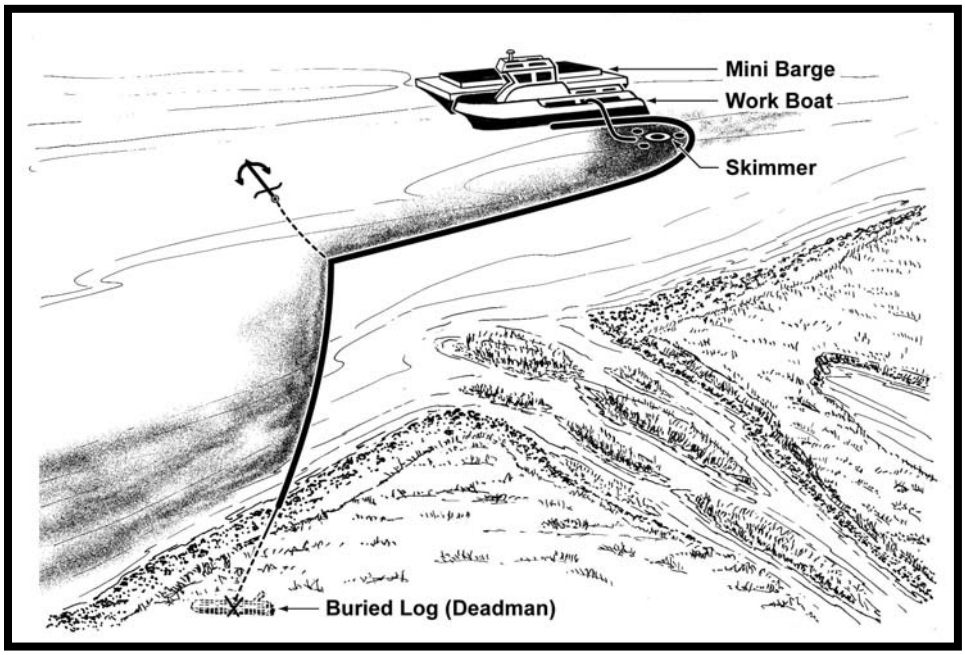
Deflection of oil toward shore for recovery with portable skimmers. Temporary storage of recovered oil in bladders or Fast-Tanks, and burning of isolated pools of oil.

FIGURE 1-5
SHORELINE CLEANUP AND BACKWATER PROTECTION



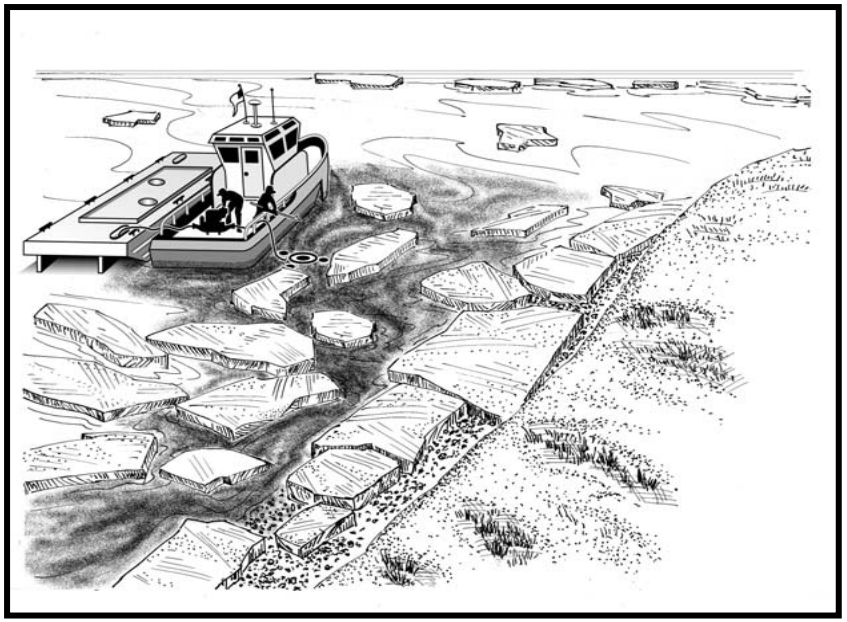
Physical removal of oil and oiled debris on beaches. Temporary blockage of marshes and other wetland areas.

FIGURE 1-6
NEARSHORE DIVERSION AND RECOVERY OF OIL



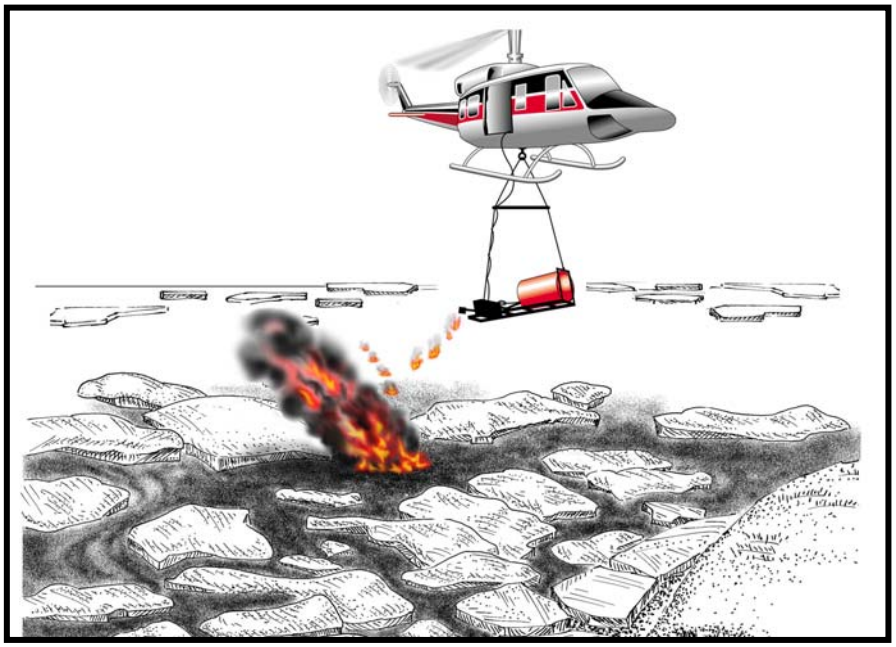
Protection of environmentally sensitive shoreline areas with recovery away from the shoreline

FIGURE 1-7
NEARSHORE RECOVERY IN BROKEN ICE



Recovery of oil that is wind-herded and trapped within ice cakes nearshore. Transfer of the recovered oil directly to a mini-barge.

FIGURE 1-8
NEARSHORE IGNITION OF OIL IN ICE



Heli-Torch ignition of oil that is wind-herded and trapped within ice cakes. Burning with gelled fuel igniters released upstream and allowed to drift into the oil.

FIGURE 1-9
ACS *TECHNICAL MANUAL*, VOLUME 2

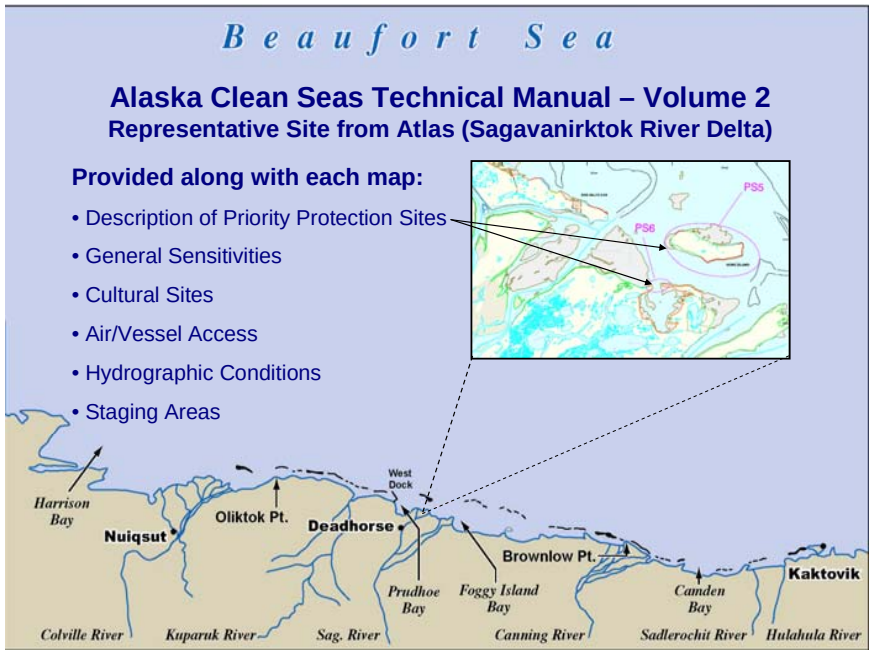
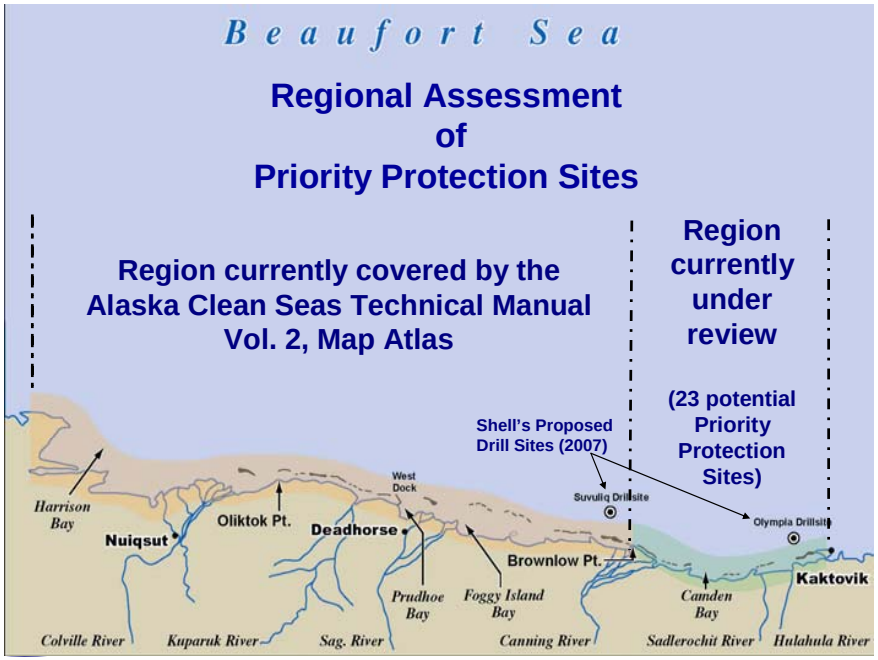


FIGURE 1-10
REGIONAL ASSESSMENT OF PRIORITY PROTECTION SITES



1.6.13 Spill Response Scenarios

Introduction

The ADEC Response Scenario/MMS Worst Case Discharge (WCD) Scenario contained herein was prepared to comply with both MMS regulations found in 30 CFR 254.26 for the discussion of the WCD scenario, and ADEC regulations found in 18 Alaska Administrative Code (AAC) 75.425(e)(1)(F) and (I) for the response scenario that demonstrates a plan holder's ability to respond to a discharge of the response planning standard (RPS) volume.

The scenario is provided to show spill response capabilities for employing an effective cleanup response for a "blowout lasting 30 days," as required under MMS regulations in 30 CFR 254.26 and 30 CFR 254.44. ADEC requires the blowout to last 15 days, but to comply with the MMS requirement, Shell has extended the blowout duration to 30 days.

A response strategy is provided in this plan following the Response Scenario/WCD Scenario to meet both the WCD scenario requirements of the MMS "in adverse weather conditions," with equipment that is "suitable, within the limits of current technology, for the range of environmental conditions" anticipated, and the ADEC requirements for a response strategy accounting for variations in receiving environments and seasonal conditions. The response strategy also illustrates additional spill response capabilities for employing an effective clean up response using non-mechanical response options.

This section contains the following:

- Scenario 1, Response Scenario/WCD Scenario, Offshore Sub-Sea Well Blowout During Summer Months
- Response Strategy 1, Offshore Sub-Sea Well Blowout in Varying Ice Conditions
- Response Strategy 2, Offshore Fuel Transfer Release During Summer Months

The following were developed in accordance with MMS regulations in 30 CFR 254.26, ADEC 18 AAC 75.425(e)(1)(F), and 18 AAC 75.445(d). They describe equipment, personnel, and strategies that could be used to respond to an oil spill. The scenarios are for illustration only and are not performance standards or guarantees of performance. The scenarios assume conditions of the spills and responses only to display general procedures, strategies, tactics, and selected operational capabilities. See ACS *Technical Manual,* Volume 1.

In situ burning could be used in a spill response to reduce the quantity of oil, regardless of whether a scenario hypothesizes in situ burning to help meet the RPS.

The scenarios were developed in accordance with the guidelines established by the North Slope Spill Response Project Team. These guidelines can be found in the front portion of Volume 1 of the ACS *Technical Manual*.

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SCENARIO 1

ADEC RESPONSE SCENARIO
MINERALS MANAGEMENT SERVICE
WORST CASE DISCHARGE SCENARIO

WELL BLOWOUT DURING
OFFSHORE SUB-SEA SUMMER MONTHS

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SCENARIO 1 QUALIFICATION STATEMENT

This worst case discharge scenario was prepared to comply with both Minerals Management Service regulations in 30 CFR 254.26, and Alaska Department of Environmental Conservation (ADEC) regulations in 18 AAC 75.425. The scenario is not a guarantee of performance. It is prepared as an illustration of the spill and response conditions that could be expected in the event of a worst case discharge. The scenario makes certain assumptions about spill conditions and describes equipment, personnel, and strategies that would be used to respond to a worst case discharge.

The response timelines are for illustration only. Spill response decisions depend on safety considerations, weather, and other environmental conditions. It is the discretion of the Incident Commander and persons in charge of the spill response to select any sequence or take as much time as necessary to employ an effective response without jeopardizing personnel safety. In any incident, personnel safety is considered the highest priority.

Depending on conditions, some equipment named in the scenario may be replaced by functionally similar equipment. The scenario assumes that agency permits are immediately granted by on-scene coordinators and other agency officials.

Greater responses than illustrated in the scenario can be mounted with additional in-region resources and the mobilization of out-of-region resources as needed.

How the Scenario Complies with the Minerals Management Service Requirement

The scenario provides a simulation of a worst case discharge with the type of responses that could be employed, to the maximum extent practicable.

Table 1-10 details how the scenario meets the MMS regulatory requirements (30 CFR 254.26) for a worst case discharge. Many assumptions are made about environmental conditions, oil distribution, and response capabilities. References to documents that support these assumptions are provided in the table. These documents are publicly available at MMS and ADEC, along with the Alaska Clean Seas (ACS) *Technical Manual*.

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TABLE 1-10
SUMMARY OF HOW THE WORST CASE DISCHARGE SCENARIO COMPLIES WITH MMS REGULATIONS

MMS REGULATION	SUMMARY	REFERENCE
30 CFR 254.26(a) and 254.47(b) Worst Case Discharge Volume for Exploratory or Development Drilling Operations	The worst case discharge volume of oil for this regional exploration plan is based on the ADEC response planning standard daily volume for an exploration well blowout of 5,500 barrels of oil per day (bopd).	See the OPA 90 MMS cross reference section at the front of this plan for descriptions of the basis for the worst case discharge estimate. The estimates follow 30 CFR 254.47(b) regarding worst case discharges for exploratory drilling operations. The total capacity of the oil storage tanks is the sum of permanent oil storage containers on the drill rig. Because there are no relevant well data or other supporting technical documentation to estimate the simulated blowout rate of the exploration well, the daily rate is based on the ADEC response planning standard of 5,500 bopd.
30 CFR 254.26(b) Oil Trajectory	The simulation of the oil plume on water is based on a well blowout at the sea floor (or mud line) in approximately 100 feet of water. The oil rises to the surface and spreads as a function of ocean currents and wind. The oil's viscosity and emulsification tendency affects its distribution on the sea. The scenario simulates the oil footprint by trajectory modeling performed by estimating the prevailing winds and local ocean currents during a 30-day blowout. The modeling was performed by The Response Group of Houston, Texas. The speed and direction of wind and currents determine the oil trajectory on the sea. Oil on open water, unaffected by ice, is assumed to move with surface currents and at 3 percent of the wind speed (see ACS *Technical Manual*, Tactic T-5). Tactic T-4 from the ACS *Technical Manual* is used to track the oil plume on open water throughout the spill response.	Modeling of the oil plume migration was conducted by The Response Group using local wind data and ocean currents. Trajectory calculations are presented in Tactic T-5 from the ACS *Technical Manual*. Portions of the ACS *Technical Manual* cited in the scenario are incorporated by reference. Wind direction is simulated as prescribed by 18 AAC 75.425(e)(1). Wind direction and velocity data were retrieved from the Alaska Climate Research Center website for Barter Island from 1971 through 1988 for the months of August through October. The average wind velocity in August is ~10 miles per hour (mph). The website URL is: http://climate.gi.alaska.edu/climate/Wind/Direction/BarterIsland/Data_table.html
30 CFR 254.26(c) Important Resources	Resources of environmental or special economic importance that might be impacted are the marine bird and mammal populations that occupy the sea between the open water and the shoreline and the shorelines of the barrier islands that lie in the oil trajectory. The trajectory is described in the body of the scenario. The resources are described more fully in the references.	Resources of special economic or environmental importance that potentially could be impacted in the areas in the trajectory are described in the Alaska Regional Response Team's "North Slope Sub-area Plan," Areas of Concern, which is also printed in the ACS *Technical Manual*, Volume 2, Map Atlas, and from Environmental Sensitivity Index Maps published by NOAA.

TABLE 1-10 (CONTINUED)
SUMMARY OF HOW THE WORST CASE DISCHARGE SCENARIO COMPLIES WITH MMS REGULATION

MMS REGULATION	SUMMARY	REFERENCE
30 CFR 254.26(d)(1) Response Equipment	The scenario identifies the types, numbers, and usage of the equipment capable of containing and removing the oil.	The equipment descriptions, locations, owners, inventory, quantity and capabilities are described in the AES *Response Tactics Manual* and ACS *Technical Manual,* Volume 1.
30 CFR 254.44(a) Effective Daily Recovery Capacities	The effective daily recovery capacities of the four Lamor brush skimmers (205 m^3/hour (1,289 bbl/hour) are determined using 20 percent of the manufacturer's nameplate capacity. Each brush skimmer is therefore derated to 258 bbl/hour. While twin pumps (each with 115 m^3/hour pump rate) in the skimmer's hopper actually exceed the skimmer's rate of recovery, the smaller value of 205 m^3/hour is used times 24 hours per day, as specified in the regulation. 1,289 bbl/hr x 0.20 = 258 bbl/hr (per skimmer)	ADEC rates most skimmers at 80 percent of the manufacturer's nameplate capacity, and assumes an oil emulsification factor of 1.54 and that skimmer operation occurs for 20 hours of each 24-hour period. Federal pump de-rating regulations are more conservative than the corresponding ADEC regulations. Consequently, Shell uses federal de-rating regulations (see Table 1-13).
30 CFR 254.44(b) Other Efficiency Factors	A smaller skimmer, the LORI LSC (similar to Lamor brushes) is derated to 80 percent of the effective nameplate capacity of the pumps. The resulting derated oil recovery rate is 217 bbl/hr per skimmer. 271 bbl/hr x 0.80 = 217 bbl/hr (per skimmer) The effective manufacturer's nameplate pumping capacity of other skimmers are listed in the ACS *Technical Manual*.	See the ACS *Technical Manual*, Volume I, Tactic L-6, for other pump rates.
30 CFR 254.26(d)(2) Deployment and Operation	The deployment of field personnel, vessels, and supplies needed to operate the oil removal and storage equipment are described in Tables 1-13 through 1-18 of the scenario.	An OSRV/OSRB is assigned to each drill rig during all drilling operations. A description of the OSRV/OSRB and the associated oil spill response equipment, vessels, and supplies contained on each vessel is described in Section 3.6. Equipment lists, locations, and owners of the equipment, as well as key oil spill response staffing lists, are described in the AES *Response Tactics Manual* and the ACS *Technical Manual*, Volume 1.
30 CFR 254.26(d)(3) Oil Storage, Transfer, and Disposal	The oil storage, transfer equipment, and disposal options, including barges, mini-barges, and fast tanks, and transport to oil processing facilities, are described in the scenario.	The types, locations, owner, quantity, and capacity of the scenario's equipment are described in the AES *Response Tactics Manual*, the ACS *Technical Manual*, Volume 1, and Section 1.6.10, Temporary Storage and Disposal.

TABLE 1-10 (CONTINUED)
SUMMARY OF HOW THE WORST CASE DISCHARGE SCENARIO COMPLIES WITH MMS REGULATION

MMS REGULATION	SUMMARY	REFERENCE
30 CFR 254.26(d)(4)(i) Time for Procurement of Oil Containment, Recovery, and Storage Equipment	Time for procurement, mobilization, and transit time is reflected in the scenario.	Mobilization and deployment time for offshore response equipment is specified in Tables 1-13 through 1-18. Nearshore and shoreline response equipment mobilization from ACS is specified in equipment tables in the ACS *Technical Manual* tactics that the scenario incorporates by reference. In addition, Shell has the capability to mobilize out-of-region resources within 24 hours if needed. See Tactics L-8, L-9, and L-10.
30 CFR 254.26(d)(4)(iii) Time for Procurement of Personnel	Procurement, mobilization, and transit time for personnel is reflected in the scenario.	Mobilization time for staff operating vessels and other equipment contained on the OSRV/OSRB is less than 1 hour. Mobilization time for other oil spill staff is specified in the AES *Response Tactics Manual* and the ACS *Technical Manual*. Equipment operators and crews mobilize with their equipment from North Slope origins through ACS contracts and mutual aid agreements; See Tactics L-8, L-9, and L-10 for mutual aid agreements, master agreements, and other agreements for accessing equipment.
30 CFR 254.26(d)(4)(iv) Equipment Loadout Time	Initial response vessels and equipment are contained on the OSRV/OSRB. An OSRV is stationed with each operating drill rig and the loadout times are reflected in the scenario. The loadout times for nearshore and shoreline response equipment are included in the mobilization times listed in the ACS *Technical Manual* tactics equipment tables and are incorporated here by reference.	Equipment loadout time is included in the mobilization times specified for equipment and vessels listed in the ACS *Technical Manual* tactics that the scenario incorporates by reference.
30 CFR 254.26(d)(4)(v) Travel Time	Times to travel to the deployment site for the offshore, nearshore, and shoreline tactical units (personnel and equipment) are described in the narrative of the scenario.	Travel times to the deployment sites are included in attached tables and the ACS *Technical Manual*, Tactic L-3, lists travel rates for ACS support equipment.
30 CFR 254.26(d)(4)(vi) Deployment Time	Times to deploy equipment are described in the scenario narrative and incorporated by reference to particular ACS *Technical Manual* tactics that list deployment times.	Deployment times are specified in the attached tables. The ACS *Technical Manual* contains tactics equipment tables that list equipment deployment times. The current Shell leases are a maximum of 160 air miles from Deadhorse. Assuming a helicopter travel speed of 100 miles per hour, the maximum travel time to a Shell lease is 1.6 hours.

TABLE 1-10 (CONTINUED)
SUMMARY OF HOW THE WORST CASE DISCHARGE SCENARIO COMPLIES WITH MMS REGULATION

MMS REGULATION	SUMMARY	REFERENCE
30 CFR 254.26(e)(1) Equipment and Strategies are Suitable for Conditions	Response equipment illustrated in the scenario is designed to operate within the range of environmental conditions projected to be encountered at the exploration leases. The equipment available on the two OSRV/OSRB and on the North Slope, and selected for the simulated deployments in this scenario, is the "best available technology" for responding to oil well blowouts in the offshore and nearshore Beaufort Sea. Equipment in the scenario has been tested and selected as the most suitable for mechanical oil recovery in broken ice and open water conditions associated with the regional exploration plan. Response strategies illustrated in the scenario are also suitable, within the limits of current technology, for the range of environmental conditions anticipated. The strategy of mechanical recovery illustrated in the scenario reflects best available technology for the environmental conditions. The strategy has been tested, exercised, and selected as most suitable for the conditions.	See the following analyses and reports that indicate the scenario's equipment and strategies are most suitable: Blowout response plans, in Section 1.6 of this plan. Alaska Clean Seas *Technical Manual*, Volumes 1, 2, and 3.
30 CFR 254.26(e)(2) Standard Terms for Conditions and Equipment Capabilities	The scenario employs standardized, defined terms to define environmental conditions and response equipment. The terms in the scenarios are consistent with terms used in spill response planning in general and for North Slope responses in particular.	For definitions of terms, see the following document: Alaska Clean Seas *Technical Manual*, Volumes 1, 2 and Alaska Climate Research Center website containing Barter Island data from 1971 through 1988: http://climate.gi.alaska.edu/

Simulated Weather and Sea Conditions at Spill Scene

The scenario reflects historical sea and weather conditions that are described in references cited in the last column of Table 1-10.

On August 1, the sea is ice-free at the drilling location with daylight lasting 21 hours per day and decreasing to 16 hours per day by August 30. The average daily maximum and minimum air temperatures are 44°F and 34°F. The average wind speed is 10 mph or 8 to 9 knots.

Characteristics of the Simulated Discharged Oil [30 CFR 254.26(a)]

Oil reaches the surface from the exploration well several hours after a kick is detected. Oil flows at the rate of 5,500 bopd. Gas and oil reach the sea floor through a 6-inch orifice at the mud line. Gas releases at 5 million standard cubic feet per day (mmscf/d). The blowout discharges a total of 165,000 bbl of crude oil over 30 days.

For the purposes of the C-Plan, the properties of the crude oil from the proposed drilling locations are expected to be broadly comparable to the analysis of samples obtained previously from the Hammerhead prospect (now called Sivulliq) in 1985:

API gravity (60 deg. F):	20.2
Viscosity (60 deg. F):	468 cp
Water content in oil/water Emulsion (wt %):	12
Asphaltene content (wt %):	0.5
Pour point (deg. F):	-10

Assay comments[1]: "…Both crudes are of intermediate gravity, have low wax, asphaltene, and sulphur content, but an intermediate resins content, are acidic and fairly viscous. The crudes are unusual in that they are devoid of light ends…"

Aerial Deposition

The well blowout occurs at the mud line and the crude oil migrates to the water surface. No aerial deposition occurs.

Oil Spill Trajectory [30 CFR 254.26(b)]

August 1 through August 30

Oil on open water is assumed to move with surface currents and at 3 percent of the speed. If left uncontained and uncollected, the oil plume migration is driven by ocean currents and prevailing winds for the 30-day duration of this scenario. The regional ocean current used for the trajectory modeling was 0.75 knots to the west-northwest. Wind data used for the trajectory modeling were collected from the nearest National Weather Service weather station. Wind data observations from the Barter Island station,

[1] As reported by V.R. Kruka, SWEPI, Jan. 1986.

tabulated from August 1 through August 30 between 1971 and 1988, were used to simulate the prevailing winds. The predominant wind directions were determined as the 16 cardinal compass directions with a frequency greater than 10 percent of the time. These four wind directions were then normalized to 100 percent resulting in the following set of prevailing winds:

- East wind = 34.3% frequency
- West Northwest (WNW) wind = 22.4% frequency
- West wind = 21.9% frequency
- East Southeast (ESE) wind = 21.3% frequency

The trajectory simulation uses these winds in two 15-day cycles for the 30-day simulation with the duration calculated from the frequency percent of each wind direction. For purposes of the scenario, the model employs an East wind at the time of the blowout. This is the most conservative trajectory model, as the wind and the ocean current are both from the East, resulting in the quickest movement of the leading edge of the oil plume from the well site. The wind pattern for the scenario is:

- Day 1 through Day 5, Hour 4: wind from the east
- Day 5, Hour 4 through Day 8, Hour 13: wind from the WNW (292.5^{o})
- Day 8, Hour 13 through Day 11 Hour 20: wind from the west
- Day 11, Hour 20 through Day 15: wind from the ESE (112.5^{o})
- Day 16 through Day 21, Hour 4: wind from the east
- Day 21, Hour 4 through Day 24, Hour 13: wind from the WNW (292.5^{o})
- Day 24, Hour 13 through Day 27 Hour 20: wind from the west
- Day 27, Hour 20 through Day 30: wind from the ESE (112.5^{o})

The Response Group trajectory (Figure 1-11) shows a majority of the discharged oil moving offshore with lesser amounts impacting the mainland and barrier islands between Cross Island and Barrow. From Day 1 through Day 5, Hour 4, oil movement is controlled by a 0.75-knot WNW current and a 10-knot wind from the east. Left unrecovered, the oil plume travels almost due west in open water and first impacts land at Cross Island after 67 hours. By Day 19, the oil would have reached the shorelines of Barrow and would then move to open water north of land.

The final Environmental Impact Statement for the Beaufort Sea Planning Area Oil and Gas Lease Sales, prepared by the MMS (OCS EIS/ES MMS 2003-001), includes an analysis of how and where offshore spills move using a computer model called the Oil-Spill-Risk Analysis Model of the U.S. Geological Survey, developed in 1982. Working with both summer and winter conditions, thousands of trajectories were run for spill source locations that closely represent Shell's proposed drill sites in the Beaufort Sea. The trajectories were run using offshore and nearshore environmental conditions collected by governmental organizations and universities between 1982 and 1996.

The Response Group trajectories are consistent with the results presented in the MMS EIS. The MMS report reveals probabilities of impact to be typically 0.5% to 3% within the region between Point Brower, Prudhoe Bay, Arey Island, and Barter Island (Land Segments 39 through 46). These probabilities are based on oil left in the environment (i.e., no cleanup response) for 30 days, from source locations (Hypothetical Launch Areas #15 and #17) that include Shell's proposed drill sites at Olympia and Sivulliq.

While the trajectory modeling of hypothetical oil spills for the region of concern is valuable as an indication of probable shoreline impact, Shell recognizes the need to plan for those wind and sea conditions that could conceivably drive oil directly toward shore and other sensitive resources. BAT has been used wherever possible, along with the expertise of ACS and AES, to ensure that a timely and effective response is mobilized by the end of Day 1 to protect priority sites in the event that oil reaches the shore earlier than forecasted by the trajectory simulation (see Table 1-12).

Resources of Importance [30 CFR 254.26(c)]

Resources of special economic or environmental importance could be impacted by the spilled oil. The marine and coastal bird and mammal populations and shoreline cultural resources occupying the path of the spilled oil described in the trajectory section potentially could be affected by oiling. Many of the birds and mammals are important both ecologically and economically. Two primary documents list the marine mammal groups and the marine bird groups that may be potentially exposed to the scenario's oil. The ACS *Technical Manual*, Volume 2, contains information from Brownlow Point westward. NOAA ESI Maps contained in the *Sensitivity of Coastal Environments and Wildlife to Spilled Oil, North Slope, Alaska, Atlas* were used to identify marine mammals and marine bird groups from Brownlow Point eastward to Barter Island. The ACS *Technical Manual* and the ESI Maps also describes the seasonal distribution of marine mammals and birds in the spill vicinity and simulated trajectory path. Endangered and threatened species are also identified with notes describing protection strategies. Shoreline habitats exposed to the oil are listed by level of concern and depicted on maps of the spill area. Known cultural resource sites are listed on the ACS *Technical Manual* maps. The ACS *Technical Manual* lists are adapted from the Alaska Regional Response Team's "North Slope Subarea Plan."

There are two primary strategies necessary to protect resources of importance. The primary strategy is to contain and recover, and remove oil as quickly as possible while it is encountered in a thick layer at the blowout site. Focusing on the release site will most effectively reduce the quantity of oil available to move away from the blowout into sensitive areas later.

The second important strategy is to contain and recover oil that has escaped the primary recovery operations near the spill site. This secondary recovery will involve the self-propelled skimming boat operated by AES and the skimming boats operated by ACS closer to shore. ACS will also deploy exclusion and deflection boom at selected shoreline sites. All of these priority protection sites are identified in the ACS *Technical Manual*, Volume 2, or in the NOAA ESI maps.

To protect shoreline sites from oncoming oil that escapes the offshore oil removal task forces, teams of workboats tow boom from Prudhoe Bay and anchor it in shallow water as far east as Brownlow Point. Exclusion booming and deflection booming tactics, including equipment lists, personnel numbers, procedures, and mobilization and deployment times, are described in ACS *Technical Manual* Tactics C-13, C-14, and C-15. The features of the vessels and boom are outlined in Tactic L-6. Response teams may also fly from Prudhoe Bay to shoreline staging areas, then use work boats to travel westward to protect environmental sensitivity sites along the shoreline between Kaktovik and Brownlow Point. To protect birds and mammals, the main strategy is removing oil from the environment. The secondary strategy for wildlife protection is hazing. By hour 24, ACS equipment and trained personnel are working near the barrier islands and shoreline. Oiled carcasses are collected to remove them as sources of injury to predators. Oiled animals are captured, stabilized, and treated by specialists using ACS equipment, including the wildlife stabilization facility at Prudhoe Bay. Animals requiring further treatment are transported to the Alaska Wildlife Rehabilitation Center in Anchorage. See ACS *Technical Manual* Tactics W-1 to W-6 for decision-making and field procedures.

Discussion of Equipment, Personnel, and Times [30 CFR 254(d)]

The following discussion illustrates a response to a worst case discharge scenario described in conditions stated above. Descriptions of conditions are provided in the Simulated Conditions section of the scenario and in ACS *Technical Manual,* Tactic L-7, Realistic Maximum Response Operating Limitations for Mechanical Response Equipment. In addition, skimmer capacities are derated to reflect the effects of adverse weather, among other factors. Adverse weather conditions involving low temperatures and varying ice conditions are demonstrated in the ADEC Response Strategy following this Response Scenario/Worst Case Discharge Scenario.

The locations, owner, and capacities of response equipment, personnel, materials, OSR support vessels, oil storage, transfer, and disposal equipment referenced in the scenario are listed in the AES *Response Tactics Manual* and the ACS *Technical Manual*. ACS *Technical Manual* tactics are incorporated into the scenario by reference.

Mobilization and deployment times of the scenario's containment and recovery, storage equipment, equipment transportation vessels, and personnel to load and operate the equipment are listed in the AES *Response Tactics Manual*, the ACS *Technical Manual* tactics equipment tables, and Table 1-14 of the scenario. Equipment loadout times to transfer equipment to vessels are incorporated into the mobilization times.

TABLE 1-11
WELL BLOWOUT IN SUMMER
SCENARIO CONDITIONS

INITIAL CONDITIONS	
Spill Location	Shell Olympia Exploration Well, drilled by drill ship *Frontier Discoverer*
Date	August 1
Duration	30 Days
Type of Spill	North Slope Crude Oil
Source of Spill	Uncontrolled well blowout at the mud line through an open orifice in 100 feet of water
Quantity of Oil Spilled	RPS Volume = 5,500 bopd x 30 days = 165,000 bbl
Emulsification Factor and free water pickup	1.54 x 165,000 bbl = 254,100 bbl. This is the oil emulsion volume created by skimming/pumping operations. Assuming that approximately 20% of the original oil volume recovered is added to this mix as free water (~33,000 bbl), the total volume of fluids (emulsion + free water) could conceivably require approximately 287,100 bbl.
Wind Speed	10 knots
Wind Direction	Wind direction is simulated as prescribed by 18 AAC 75.425(e)(1). Wind direction data were retrieved from the Alaska Climate Research Center for Barter Island from 1971 through 1988 for the months of August through October. The website URL is: http://climate.gi.alaska.edu/climate/Wind/Direction/BarterIsland/Data_table.html. All wind directions with a daily persistence greater than 10 percent were selected and normalized to 100 percent. The 4 primary wind directions and their relative percent frequency were applied in two wind cycles of 15 days each. The wind directions and durations for the 30-day scenario are: Day 1 through Day 5, Hour 4: wind from East Day 5, Hour 4 through Day 8, hour 13: wind from WNW (292.5°) Day 8, Hour 13 through Day 11 Hour 20: wind from West Day 11, Hour 20 through Day 15: wind from ESE (112.5°) Day 16 through Day 21, Hour 4: wind from East Day 21, Hour 4 through Day 24, Hour 13: wind from WNW (292.5°) Day 24, Hour 13 through Day 27 Hour 20: wind from West Day 27, Hour 20 through Day 30: wind from ESE (112.5°)
Air Temperature	Average daily maximum and minimum temperatures were obtained from the Western Regional Climate Center website: http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ak0558 The average daily maximum and minimum air temperatures for August are 44°F and 34°F, respectively.
Surface Current	0.75 knots to the WNW
Visibility	Variable
Surface	The well location is a Shell offshore mobile drilling platform located 120 nautical miles or less from the second Shell offshore mobile drilling platform and corresponding OSRV. The prospect is located in federal waters in the Beaufort Sea, approximately 10 nautical miles northwest of Kaktovik and not further than 120 nautical miles from the second Shell drilling platform. Wave heights are typically 1½ to 2 feet with no ice present.
Trajectory	Modeling of the oil plume migration was conducted by The Response Group using local wind data and ocean currents. Portions of trajectory calculations presented in Tactics T-4 and T-5 from ACS *Technical Manual* are incorporated by reference. The trajectory model developed by The Response Group uses Applied Science Associates, Inc.'s OilMap software. Based on environmental conditions such as predominant winds and currents, the output from this model shows estimated oil concentrations and predicted shoreline impact of a potential blowout. The oil trajectory model includes algorithms for spreading, evaporation, emulsification, and entrainment, all of which are input parameters based on the properties of the crude oil. The results identify potential shoreline impact and provide graphical representation for instantaneous or continuous release spills (Figure 1-11). Input parameters include a spill volume of 5,500 bopd of North Slope crude oil with 28 API. Local wind data and ocean currents used for the model includes 10 knots wind from the East and a

TABLE 1-11 (CONTINUED)
WELL BLOWOUT IN SUMMER
SCENARIO CONDITIONS

INITIAL CONDITIONS	
	current of 0.75 knots to the WNW. The figure shows the model at 72 hours into the spill and identifies the amount of evaporation and oil thickness at this time. The simulated oil discharge of 5,500 bopd is ejected through a 6-inch ID well at the mud line, in water approximately 100 feet deep. Within minutes of the blowout, oil rises to the surface of the sea. The oil plume migrates to the west as a function of water currents and the direction of the prevailing wind. Within 67 hours, if the oil remained uncontained and unrecovered, the leading edge of the plume could reach Cross Island, approximately 145 nautical miles west of the blowout.

TABLE 1-12
WELL BLOWOUT IN SUMMER SCENARIO
RESPONSE STRATEGY

ADEC REQUIREMENT	RESPONSE STRATEGY	ACS *TECHNICAL MANUAL* TACTIC
(i) Stopping Discharge at Source	As soon as the well kicks, subsurface well control is initiated (increasing mud weight, blowout preventer activation). Initial attempts fail and the Olympia exploration well is now classified as an "unobstructed" blowout well (T+00 hours). The well has a continuous flow rate that will deposit at the surface a total of 5,500 bopd. The On-Site Shell Drill Foreman notifies ACS and AES personnel on the OSRV collocated with the drilling ship. Notifications to appropriate state and federal agencies are performed. The National Response Center (1–800–424–8802) is notified, and the IMT is activated. The second Shell drill ship and associated OSRB located at a maximum distance of 120 nautical miles is notified. The second drill ship stops drilling operations and releases their oil response resources to the blowout site. An oil storage tanker, centrally located between the two drilling sites is also notified and immediately deployed to within a few miles of the blowout. Safety analyzed the situation and initiates equipment and personnel mobilization in order to stop the blowout. Well Control is discussed in Section 1.6.3 of this plan. Anchors are pulled and the drill ship is moved away from the sea floor blowout when control is lost and safety is a concern.	Volume 3 ICS Table 1-1, Section 1 of this plan A-1, A-2
(ii) Preventing or Controlling Fire Hazards	Throughout the first few hours of the spill, the Site Safety Officer verifies that all sources of ignition are shut down or removed from the area. The Site Safety Officer provides access zone information and determines PPE requirements. Monitoring protocol is established for all work areas to ensure personnel protection. The monitoring protocol establishes safety zones according to applicable OSHA and fire hazard standards. Consideration is given to pull anchors and move the drill ship from the well blowout.	S-1 through S-6
(iii) Well Control Plan	Well Control is detailed in Section 1.6.3 of this plan. The following briefly describes well control measures at the simulated blowout at the Olympia exploration site: In the event of a blowout a well control specialist would be consulted for the intervention and resolution of a well control emergency. **T+12 Hours**, the relief well plan is implemented in the event the surface control measures fail. Personnel and equipment are mobilized. Initially, the Olympia drill ship attempts to plug stop (or slow) the blowout by pumping mud and/or concrete downhole. After initial efforts fail, the drill ship pulls away from the well blowout location in order to support safe recovery operations. Repairs are initiated in order to facilitate potential relief well drilling. The second drill ship, at the Sivulliq site, has ceased drilling operations and begun preparations to deploy to the blowout site. The rig is located not further than 120 nautical miles and will arrive in 1.5 to 3 days, depending on conditions. Equipment needed for potential oil recovery and well control support is placed on standby. Helicopters in Prudhoe Bay are put on standby. **T+4 Days**. Equipment and personnel required for well control arrive at the drill rig. Potential subsurface control measures are evaluated. Damage to the drill site and the ability to access the actual rig and controls are determined. All options are considered (see Section 1.6.3). **T= 15 Days**. Well begins to bridge and flow rate decreases linearly.	Section 1.6.3
	T= 30 Days. Surface control of the blowout is achieved and relief well installation is suspended	

TABLE 1-12 (CONTINUED)
WELL BLOWOUT IN SUMMER SCENARIO
RESPONSE STRATEGY

ADEC REQUIREMENT	RESPONSE STRATEGY	ACS *TECHNICAL MANUAL* TACTIC
(iv) Surveillance and Tracking of Oil	Oil movement is tracked using a combination of visual observations and remote sensing techniques. Within the first 4 hours of initial notification of the blowout, the Kuparuk Twin Otter with forward looking infrared radar (FLIR) is deployed. Response vessels also deploy buoys with transmitters. Both systems are capable of real-time tracking of the leading edge of the oil. Oil location information is digitized and transferred to the IMT and On-scene Commander for response planning and trajectory modeling. NOAA and The Response Group are requested to provide trajectories based on wind speed and direction. Vector addition and trajectory modeling are used to forecast oil and movement.	T-4 T-5 T-5
(v) Exclusion Procedures; Protection of Sensitive Resources	The Environmental Unit's Cultural Resource Specialist and State Historic Preservation Officer issue an advisory. The NOAA Environmental Sensitivity Index Maps, ACS Atlas Maps, and the North Slope Subarea Contingency Plan are used to identify areas of major concern. A shoreline cleanup plan is approved by the Unified Command and the State Historic Preservation Officer. Based on trajectory calculations and oil tracking, barrier islands are identified as the first area to be impacted by oil, followed by the salt marshes and inlets adjacent to the Kadleroshilik River. Protection sites identified in these areas are identified for exclusion or deflection booming. **T+1 Day.** There are no priority protection sites on Cross Island. ACS Shoreline Protection Task Forces will be mobilized and prepared to deploy exclusion booms at **PS-56** and **PS-57** on Flaxman Island, if needed. Two teams, traveling by small workboats and airboats from Prudhoe Bay, each place boom in the quantities described in ACS *Technical Manual* Map Atlas. **T+2 Days.** ACS Shoreline Protection Task Forces deploy exclusion booms at **PS3** and **PS3A** south of Tigvariak Island, and **PS-3D, PS-4, PS-4A**, and **PS-4B** adjacent to the Kadleroshilik River. ACS dispatches additional Shoreline Protection Task Forces to Barter Island to deploy exclusion boom. The protection sites located in Camden Bay are identified by trajectory models performed by NOAA and The Response Group identified above.	NOAA Environmental Sensitivity Index Maps ESI 3-5 Map Atlas Sheets 80, 83-86, 88-89, 98-100 http://www.asgdc.state.ak.us/maps/cplans/subareas.html#northslope C-14
(vi and vii) Spill Containment, Control, and Recovery Procedures	ACS has the capabilities of mounting an effective response within several days to supplement the primary response operations. **<u>Task Force (TF) Descriptions:</u>** **TF-1:** Primary response is provided by equipment stationed with the drill rig. This equipment includes an OSRV with 12,000 bbl storage capacity and two Lamor brush skimmers; two 34-foot workboats; and containment and fire boom. **TF-2:** The second response team is mobilized from an alternate drill site located within 120 nautical miles of the Olympia lease site. Equipment includes an OSRB with more than 16,000 bbl storage capacity and two skimmers; four 34-foot workboats; one 47-foot skimming vessel; and containment and fire boom. The OSRB *Endeavor* is pushed to the site by an attending tug. Task Force 2 arrives at the spill site within 24 hours. **TF-3:** A 513,000 bbl tanker between the two drill sites is deployed immediately. It arrives in 16 hours. Decanting (if required) follows FOSC plan and USCG approval. **TF-4:** ACS Shoreline Protection Task Forces mobilize from Prudhoe Bay and deploy exclusion booms at priority sites by the end of Day 1. The primary objective of TF-4 is to prevent oil from entering priority sites. TF-4 does not recover discharged oil.	R-20 R-20 R-32B R-28 C-14

TABLE 1-12 (CONTINUED)
WELL BLOWOUT IN SUMMER SCENARIO
RESPONSE STRATEGY

ADEC REQUIREMENT	RESPONSE STRATEGY	ACS *TECHNICAL MANUAL* TACTIC
	TF-5: ACS nearshore recovery teams mobilize from Prudhoe Bay to recover oil that has escaped containment from Task Forces TF-1 and TF-2. Teams utilize skimmer boats with LORI LSC skimmers and mini-barges for storage.	
	TF-6: ACS shoreline recovery teams to install boom in a hook configuration on shoreline to recover oil. Boom is anchored to the shoreline and offshore, and oil is collected with a skimmer and stored in a fast tank. One team works 10 locations within a 5-mile area. Two crews can manage shoreline operations for 10 miles.	R-32A, R-32B R-17 modified, R-28
	<u>Recovery Timeline:</u>	
	T= 1 Hour. TF-1 is deployed immediately from the drill rig and moves a safe distance from the blowout. A vessel-based boom-skimmer system deploys downwind/down current of the blowout, ahead of the leading edge of the oil plume. The objective of TF-1 is to recover oil shortly after it surfaces and begins to move from the blowout location. While the burning of the well would likely eliminate some of the surfacing oil, it is assumed here (for planning purposes) that the full WCD of 5,500 bopd (229 bbl/hr) continues to flow from the blowout.	
	TF-1 deploys two workboats that tow boom in a U-shape, open-apex formation that allows oil to filter through to the OSRV at the apex of the boom. The U-shaped formation remains in a static location situated a safe operating distance from the blowout at the thickest portion of the oil plume. The two brush skimmers on the OSRV have a combined total derated recovery of 516 bbl/hour (see Table 1-13).	R-20
	T= 16 Hours. TF-3 consists of the storage tanker. The primary objective for TF-3 is to provide oil storage for the OSRV/OSRB that have reached full storage capacity. The two on-water task forces have the skimmer and barge capacity to handle over 24 hours of oil recovery operations; however, lightering to TF-3 occurs before the recovery vessels reach full capacity. Lightering procedures are detailed in Section 1.6.8.	
	T= 24 Hours. TF-2 has arrived from the second drilling rig located not further than 120 nautical miles away. The primary objective of TF-2 is to assist TF-1 in open water oil recovery. Vessels in TF-2 are capable of establishing two additional "U"-configuration recovery teams, if necessary. In this case, the three "U"-shaped recovery teams target the thickest portion of the oil plume without hindering each other's operations. A single U-configuration can be deployed with the OSRB *Endeavor* configured with 2 LAMOR brush skimmers at the apex. The second U-configuration would have a 47-foot oil-skimming workboat equipped with two LAMOR brush pack skimmers (Figure 1-12).	R-17 modified
	J-Boom skimmer deployment is considered by TF-2 if sea conditions prevent U-Boom deployment.	
	Recovery rates of TF-1 and TF-2 are detailed in Table 1-13. The recovery rates exceed the rate that oil is released from the blowout location.	
	Oil that is not contained and recovered by TF-1 and TF-2 is transported westward by the ocean currents and prevailing winds. TF-5 is deployed from Prudhoe Bay to recover oil that is often encountered in windrows and linear slicks. TF-5 consists of two skimming vessels, one vessel is configured with two side booms and two LORI skimmers, the other vessel is configured with a single side boom and LORI skimmer. Mini-barges and shuttle boats are used to transport recovered oil to Prudhoe Bay for processing.	
	T = 2 Days. Currents and prevailing winds continue to move the oil that is not contained and recovered to the west. TF-6 is mobilized from Prudhoe Bay to install boom in a hook configuration with a Vikoma skimmer in the recover area of the boom. Each task force can deploy and maintain one team at up to 10 locations for this configuration.	R-16

TABLE 1-12 (CONTINUED)
WELL BLOWOUT IN SUMMER SCENARIO
RESPONSE STRATEGY

ADEC REQUIREMENT	RESPONSE STRATEGY	ACS *TECHNICAL MANUAL* TACTIC
	T+5 Days. Oil trajectory modeling predicts WSW movement of oil. Oil recovery vessels adjust positioning accordingly. **T+11 Days.** Oil trajectory modeling predicts WSW movement of oil. Oil recovery vessels adjust positioning accordingly.	
(viii) Lightering Procedures	Decanting (if required) follows FOSC plan approval. Stored liquids are offloaded from the OSRV/OSRB to the tanker. The TF-1 OSRV has a fluid storage capacity of 12,000 bbl, while TF-2 has a holding capacity greater than 16,000 bbl. Based on a maximum oil exposure rate of 5,500 bbl/day (or 229 bbl/hour), an emulsification factor of 1.54, and free water retained in storage (20%), each skimming vessel could be filled at a rate of approximately 400 bbl/hour. The 12,000-bbl storage capacity could therefore be filled in about 30 hours. With one of the two OSRV/OSRB recovering oil at the blowout location, the other OSRV could be traveling to the tanker and lightering its recovered fluids. The estimated time for transit and lightering is approximately 12 hours, making a 24-hour rotation cycle reasonable.	R-28
(ix) Transfer and Storage of Recovered Oil/Water; Volume Estimating Procedure	Stored liquids are offloaded from the OSRV/OSRB to the tanker. Liquids from the nearshore skimmer vessels are stored in mini-barges to be transported back to Prudhoe Bay and disposed of accordingly. Liquids recovered by the shoreline recovery task forces are stored in fast tanks or bladder tanks. See Section 1.6.10. The volumes of stored oil emulsion and free water are gauged with ullage tape and recorded on waste manifests	R-28
(x) Plans, Procedures, and Locations for Temporary Storage and Disposal	A Waste Management Plan is developed in order to (1) fill out and sign manifests; (2) measure liquid and other waste; and (3) submit a plan to ADEC for waste management. Non-liquid oily wastes are classified and disposed of according to classification. Non-oily wastes are classified and disposed of accordingly. Recovered fluids stored onboard the Arctic tanker will be disposed of outside the US, either at Shell Group refineries or other 3rd party processors, in accordance with Shell environmental policy, and relevant local laws and regulations (see Section 1.6.10).	D-1 D-2 D-3
(xi) Wildlife Protection Plan	Wildlife monitoring and deterrents to protect animals are put in place at the spill scene and impacted areas during recovery operations. The International Bird Research and Rescue Center is put on standby in the event the wildlife treatment facility is required. Building U-8 is made available to agency biologists and veterinarians standing by to respond to potential reports of oiled wildlife. An aircraft monitors wildlife twice daily at the spill scene.	W-1 W-2, W-2B, L-6 W-3 W-4 W-5
(xii) Shoreline Cleanup Plan	Depending on the location, shoreline impact is expected to occur no sooner than Hour T+43. Shoreline cleanup operations are based on a plan approved by the Unified Command. A shoreline assessment is conducted to understand the nature and extent of oiling. Based on the shoreline assessment, priorities are established for cleanup. Cleanup techniques chosen are based on shoreline type and degree of oiling. Access to the Canning River delta and shoreline with large equipment is limited.	SH-1

TABLE 1-12 (CONTINUED)
WELL BLOWOUT IN SUMMER SCENARIO
RESPONSE STRATEGY

ADEC REQUIREMENT	RESPONSE STRATEGY	ACS *TECHNICAL MANUAL* TACTIC
	Primary delta and shoreline cleanup techniques include:	
	Burning of oily vegetation,	B-2
	Deluge of minor to moderately oiled shoreline in the river, including those areas where heavier concentrations were manually removed, and	SH-3
	Natural recovery for those areas where residual staining may remain, but further recovery would cause more harm than good.	SH-2

TABLE 1-13
WELL BLOWOUT IN SUMMER
DERATED POTENTIAL RECOVERY CAPABILITY

A	B	C	D	E	F	G	H	I	J	K
ACS SPILL RECOVERY TACTIC	NUMBER OF SYSTEMS	RECOVERY SYSTEM	DERATED RECOVERY RATE PER SKIMMER [BBL/HR]	MOBILIZATION AND TRANSIT TIME TO SITE [TIME]	OPERATING TIME ON DAY 1 [HR/DAY]	RECOVERY CAPACITY ON DAY 1 [BBLS/DAY] (B X D X F)	OPERATING TIME ON DAY 2 [HR/DAY]	RECOVERY CAPACITY ON DAY 2 [BBLS/DAY] (B X D X H)	OPERATING TIME AFTER DAY 2 [HR/DAY]	RECOVERY CAPACITY AFTER DAY 2 [BBLS/DAY] (B X D X J)
AES OPEN WATER RECOVERY										
TF-1: R-20	2	Lamor 205m^3 brush skimmers Derated to 20% of the nameplate pump rate (20% x 1,289 = 258)	258	<1 Hour	24	12,384	12	6,192	12	6,192
TF-2: R-20	2	Lamor 205m^3 brush skimmers Derated to 20% of the nameplate pump rate (20% x 1,289 = 258)	258	24 Hours	0	0	12	6,192	12	6,192
TF-2: R-32B	2	Lamor 82m^3 brush skimmers (47 ft workboat) Derated to 20% of the nameplate pump rate (20% x 516 bbl/hr = 103 bbl/hr)	103	24 Hours	0	0	18	3,708	18	3,708
ACS NEAR SHORE RECOVERY										
TF-5: R32A	1	LORI LSC skimmers Derated to 80% of the nameplate pump rate (80% x 271 = 217)	217	48 Hours	0	0	0	0	10	2,170
TF-5: R32B	2	LORI LSC skimmers Derated to 80% of the nameplate pump rate (80% x 271 = 217)	217	48 Hours	0	0	0	0	10	4,340
TF-6: R-16	10	Hook Boom configuration with Vikoma or Morris skimmer	10	48 Hours	0	0	0	0	10	1,000
TOTAL BBLS OF RECOVERED LIQUIDS PER DAY						12,384		16,092		23,602

[1] Lamor pumps are derated to 20 percent per 30 CFR 254.44 (a) and (b). Federal de-rating regulations are more conservative than ADEC regulations; consequently, Federal regulations are used to estimate recovery capacity. Lori LSC-3 skimmers are an exception: a de-rating of 80% is applied to the nameplate pumping rate per MMS and ADEC guidelines.

[2] Once both Lamor systems are on location, each is capable of skimming more than 24 hours without filling. Recovery calculations assume that they go into a 24-hour rotation with only one OSRV skimming at a time, while the other transits to the tanker and offloads. For the purposes of calculating total recovery, 12 hours of recovery per day is used for the Lamor systems.

[3] Pump performance calculations assume 1 cubic meter equals 6.29 bbls (US, oil).

TABLE 1-14
MAJOR EQUIPMENT TO CONTAIN AND RECOVER OIL IN OPEN WATER

ITEM		EQUIPMENT INFORMATION	QUANTITY
TASK FORCE 1			
	Vessels		
	OSRV	300-foot Response Vessel with 12,000 bbl Storage	1
	Workboats	Kvichak 34-ft Workboat	2
	Oil Recovery Equipment		
	Large Brush Skimmer	Lamor 205m^3 Skimming Packages	2
	Vertical Rope Mop	Portable Skimming Package	1
	Mini-Brush Skimmer	Portable Skimming Package	1
	Storage Bladder	100-bbl Bladder	1
	Off Shore Boom	200-m Containment Boom Sections	4
	Fire Boom System	In Situ Burning Containment	1
TASK FORCE 2			
	Vessels		
	Barge *Arctic Endeavor*	16,800-bbl Storage Barge with Support Tug	1
	Workboats	Kvichak 34-ft Workboat	4
	Skimming Boat	Kvichak 47-ft Brush Skimming Vessel	1
	Oil Recovery Equipment		
	Large Brush Skimmer	Lamor 205-m^3 Skimming Packages	2
	Vertical Rope Mop	Portable Skimming Package	1
	Mini-Brush Skimmer	Portable Skimming Package	1
	Storage Bladder	100-bbl Bladders	2
	Kvichak Mini-Barges	249-bbl storage	4
	Off Shore Boom	200-m Containment Boom Sections	4
	Fire Boom System	In Situ Burning Containment	1
TASK FORCE 3			
	Vessels		
	Mass Storage	513,000-bbl tanker	1
	Other		
	Offloading Pumps	Mini-barge Offloading Pumps	1
		Spare Pump w/Hoses	1

TABLE 1-15
MAJOR EQUIPMENT FOR SHORELINE AND NEARSHORE OPERATIONS

TASK FORCE	EQUIPMENT	QUANTITY
TF-4, Shoreline Containment	Workboat Type C (2 teams, 2 boats each)	4
	Anchor Containment Boom	Varies among sites, >2,000 feet
TF-5, Nearshore Recovery	Skimming Vessel (Type D)	2
	Workboat (Shuttle)	2
	LORI Skimmer	3
	Boom	21 feet (R-32A), 42 feet (R-32B)
TF-6, Shoreline Recovery	Workboat Type C	2
	Vikoma or Morris Skimmer	20
	Anchor Boom	Varies, <6,000 feet (total)

TABLE 1-16
STORAGE EQUIPMENT FOR RECOVERY OPERATIONS

SUM OF CAPACITY OF OIL STORAGE TANKS		
ELEMENT	**DERATED CAPACITY (BBL)**	**REFERENCE**
OFFSHORE STORAGE		
OSRV	11,400	AES Equipment
Endeavor Barge	15,960	AES Equipment
Arctic Tanker	513,000	AES Equipment
AES Mini-barges	946 (4 x 236 bbl)	AES Equipment (comparable to ACS Mini-barges below)
NEARSHORE STORAGE		
ACS Mini-barges	1,888 (8 x 236)	ACS *Technical Manual*
SHORELINE STORAGE		
Fast Tanks	1,080 (20 x 54)	ACS *Technical Manual*
TOTAL STORAGE	**594,274**	

TABLE 1-17
STAFF TO OPERATE OIL RECOVERY AND TRANSFER EQUIPMENT

LABOR CATEGORY	TASK FORCE	DESCRIPTION	NO. STAFF PER SHIFT DAY 1	NO. STAFF PER SHIFT AFTER DAY 1
Team Leader/Field Supervisors	TF-1	OSRV Supervisor	1	1
	TF-2	OSRB Supervisor	1	1
	TF-3	Tanker Deck PIC	1	1
	TF-4	ACS	1	1
	TF-5	ACS	1	1
	TF-6	ACS	1	1
Large Vessel Response Equipment Operators, >30 feet	TF-1	OSRV Skimmer Operators	4	4
		(2) 34-ft Workboats	4	4
	TF-2	OSRB Skimmer Operators	4	4
		Skimmer Boat	0	3
		(4) 34-ft Workboats	4	8
	TF-3	Tanker	PIC	PIC
	TF-5	Workboat Type D (2 skimmer boats, 2 work boats)	4	4
Small Vessel Response Equipment Operator, <30 feet	TF-4	Workboat Type C (2 teams, 2 boats each)	4	4
	TF-6	Workboat Type C	2	2
Skilled Technicians*	TF-1	OSRV Deck Support Techs	2	2
	TF-2	OSRB Deck Support Techs	2	2
	TF-3	Tanker	PIC	PIC
	TF-4	2 Teams	8	2
	TF-5	Tactic R-32A, 1 Team	2	2
		Tactic R-32B, 1 Team	2	2
	TF-6	Tactic R-16, 2 Teams	4	2
Total Operators and Technicians	-	-	52	51

* Total is sum of vessel operators and technicians. Team leaders are vessel operators.

PIC – Person in charge, indicating that this aspect will be performed by a member of the tanker crew who is assigned to this duty; no additional response staff from Shell, AES or ACS included.

FIGURE 1-11
ESTIMATED OIL TRAJECTORY - DAY 3 (IF UNCONTAINED AND UNRECOVERED)

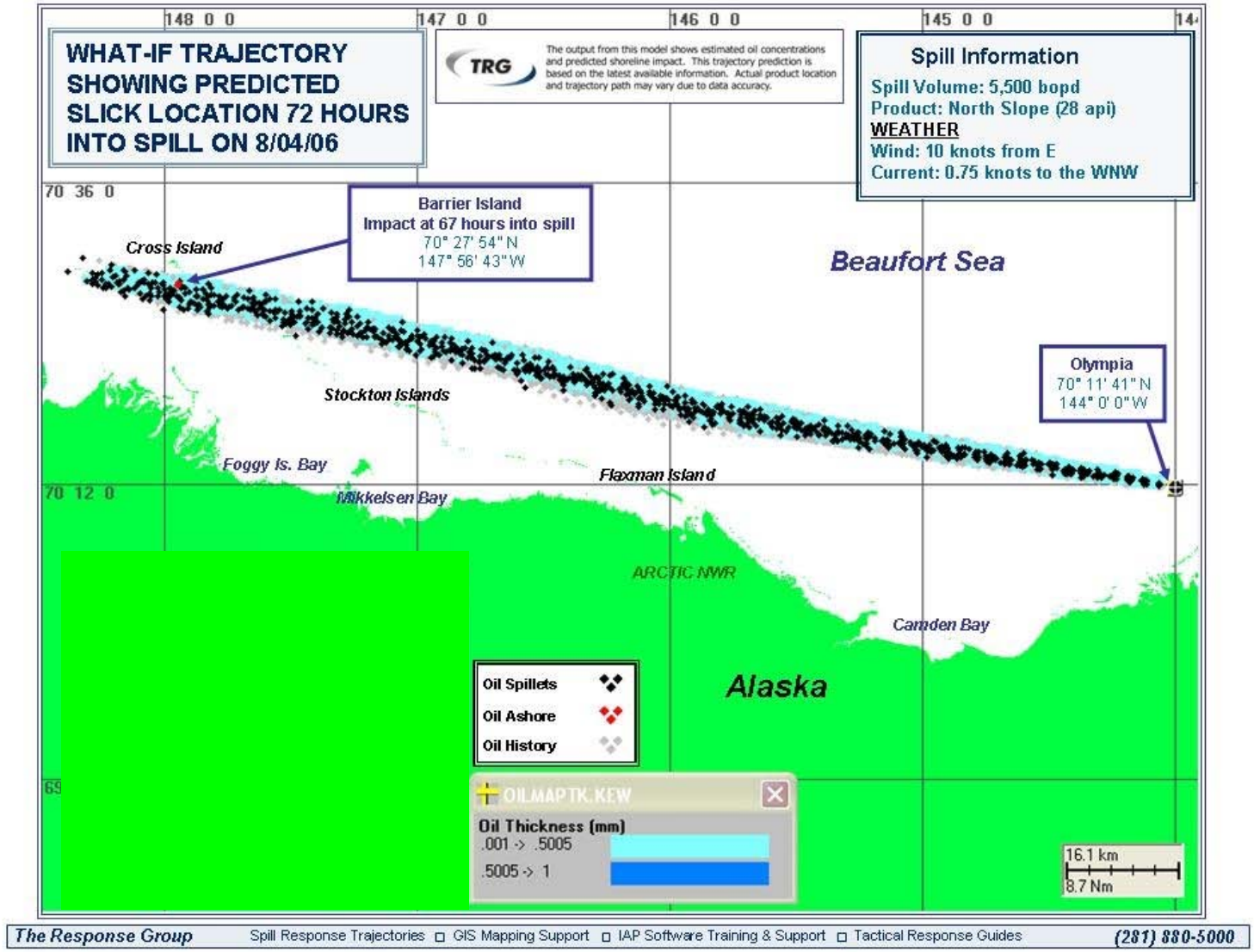
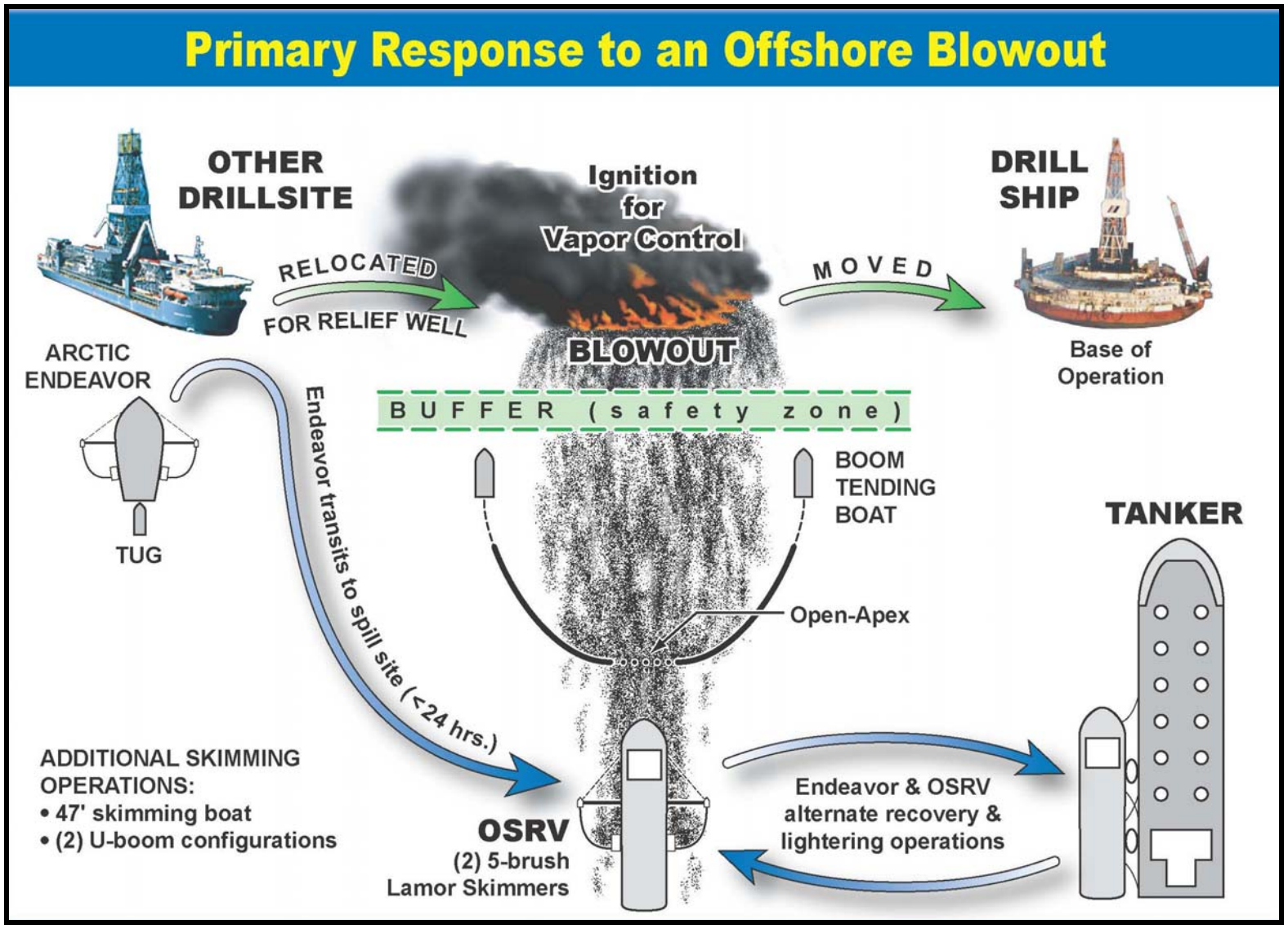


FIGURE 1-12
PRIMARY RESPONSE TO AN OFFSHORE BLOWOUT



RESPONSE STRATEGY 1

SUB-SEA BLOWOUT IN VARYING ICE CONDITIONS

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RESPONSE STRATEGY PARAMETERS

The following response strategy describes methods and equipment that could be used in response to a hypothetical oil spill from a sub-sea well blowout at one of Shell's exploratory drilling locations during varying ice conditions.

For the purposes of the strategy, a Shell exploration well on the Olympia prospect blows out at sub-sea on October 1, nine days before freeze-up. While open water at the Olympia location can (and often does) extend well into mid-October, the formation of new ice by Day 9 provides ample time for the description of response techniques during freeze-up. In this simulation, oil and gas travels from the sub-sea release at the mud line to an open region at the water's surface.

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TABLE 1-18
RESPONSE STRATEGY
SUB-SEA WELL BLOWOUT IN VARYING ICE CONDITIONS

ADEC REQUIREMENT	RESPONSE STRATEGY	APPLICABLE ACS *TECHNICAL MANUAL* TACTIC
(i) Stopping Discharge at Source	The On-site Shell Drill Foreman notifies ACS and AES personnel on the OSRV collocated with the drilling ship. All notifications to appropriate state and federal agencies are performed. The National Response Center (1–800–424–8802) is notified, and the Incident Management Team is activated. The second Shell drill ship and associated OSRB located at a maximum distance of 120 nautical miles is notified. The second drill ship stops drilling operations and deploys their OSRV. An oil storage tanker centrally located between the two drilling locations (not more than 60 nautical miles from the blowout) is also notified and immediately begins mobilizing to the spill location.	A-1, A-2
(ii) Preventing or Controlling Fire Hazards	Throughout the first few hours of the spill, the Site Safety Officer verifies that all sources of ignition are shut down or removed from the area. The Site Safety Officer provides access zone information and determines PPE requirements. Monitoring protocol is established for all work areas to ensure personnel protection from fire hazards and other blowout conditions. All anchors are pulled, and the drill ship is moved from the well blowout. As in the open-water scenario, the FOSC approves the ignition of the blowout for safety reasons.	S-1 through S-6
(iii) Well Control Plan	Well Control is discussed in Section 1.6.3 of this C-Plan.	Not applicable
(iv) Surveillance and Tracking of Oil; Forecasting Shoreline Contact Points	Oil movement is tracked using a combination of visual observations and remote sensing techniques. Within the first 4 hours of initial notification of the blowout, the Kuparuk Twin Otter with forward looking infrared radar (FLIR) is deployed. Response vessels also deploy buoys with transmitters. Both systems are capable of real-time tracking of the leading edge of the oil. By Day 9 of the spill, discharge tracking in ice is performed by helicopter, which deploys beacons capable of transmitting the leading edge of the oil. NOAA is requested to provide trajectories based on wind speed, direction, and currents.	T-4, T4A T-5
(v) Protection of Environmentally Sensitive Areas and Areas of Public Concern	Land-fast ice may exist in early October. When present, land-fast ice provides an effective natural barrier against oil reaching the shoreline. If land-fast ice has not formed, nearshore skimming operations (R-15 through R-18) will be used to intercept any oil that may approach the shoreline. In this scenario, containment booming and recovery with ACS skimmers and mini-barges is used to prevent oil from reaching the Canning River Delta and other sensitive river outlets nearby. Oil that has not been recovered by primary response methods is expected to reach the first barrier island (Cross Island) by the end of Day 3. If land-fast ice has not formed in these areas, nearshore and shoreline containment and recovery operations will be mobilized to prevent oil from reaching sensitive sites. The Environmental Unit's cultural resource specialist and State Historic Preservation Officer issue an advisory. The NOAA Environmental Sensitivity Index Maps, ACS Atlas Maps, and the North Slope Sub-area Contingency Plan are used to identify areas of major concern. A shoreline cleanup plan is approved by the Unified Command; however, it is recognized that shoreline access will be limited as land-fast ice begins to form throughout the region. Should oil move into these nearshore waters and become entrained within the growing ice, the locations of the oiled regions will be recorded and monitored for ice movement. As ice thickness increases at	NOAA Environmental Sensitivity Index Maps ESI 3-5 ACS Atlas Maps 80, 89, 100 http://www.asgdc.state.ak.us/maps/cplans/subareas.html#northslope T-2

TABLE 1-18 (CONTINUED)
RESPONSE STRATEGY
SUB-SEA WELL BLOWOUT IN VARYING ICE CONDITIONS

ADEC REQUIREMENT	RESPONSE STRATEGY	APPLICABLE ACS *TECHNICAL MANUAL* TACTIC
	these sites, stakes will be positioned to identify areas for on/in-ice recovery techniques.	
(vi) Spill Containment and Control Actions	From Day 1 and throughout the month of October, land-fast ice continues to grow out from the mainland and from long stretches of shoreline along the barrier islands. This land-fast ice becomes increasingly stable, resisting the forces of wind, current, and tidal changes. Due to the scale of the initial response to the oil farther offshore, relatively small quantities of oil are expected to reach the beaches. The land-fast ice continues to grow seaward out to depths of typically 5 to 10 meters (32 feet).	
	Beyond the land-fast ice, operations continue with conventional containment and recovery operations involving large swath, open apex U-boom configurations, funneling oil immediately downstream of the blowout into narrow, thick bands. The concentrated bands of oil are intercepted by the OSRV/OSRB, which work in a rotation cycle, filling only a portion of their onboard storage capacity with each recovery cycle (approximately 24 hours). While some oil would undoubtedly be removed by the burning gas at the blowout, it is assumed (for planning purposes only) that a substantial amount of oil continues to be released from the burning blowout.	B-3 L-2, S-6 C-12, B-5, B-6
	As offshore operations move into the second week of response, the hours of daylight and average air temperatures continue to drop, making oil surveillance and tracking more difficult, along with the location, containment, and recovery of oil.	B-5, B-6
	Intentional ignition of the blowout at the start of the spill helps keep dangerous vapors from accumulating and interfering with recovery operations; the fire helps responders to see the source from which oil is being released; and, depending upon the nature of the oil and the degree of emulsification, it is likely that some of the oil would be consumed through combustion at the spill site.	B-3, B-5
	During the second week of response (Day 8 to Day 14), the formation of grease ice and nilas (e.g., a thin elastic crust of ice up to 10 cm thick that bends easily under pressure) make it increasingly difficult to work with booms as they begin to fill with ice, preventing the effective collection of oil. During this period, recovery continues with the more narrow-swath capabilities of the outriggers on the OSRV/OSRB. Oil encounter rates are substantially reduced, and the large OSRV/OSRB, together with the smaller skimming vessels (the 47-foot boat with built-in Lamor brushes and the ACS skimming workboats), are limited to spot-removal techniques in the heaviest of concentrations. As oil accumulates in pockets, recovery continues with the OSRV/OSRB operating rope-mop and direct suction skimmers along with the over-the-side Lamor brush skimmers.	R-31
	Beyond Day 14, the on-scene drilling support vessels with ice-breaking capabilities begin to break through the formation of pancake ice and large continuous layers of thin ice. These ice breakers patrol and move ice that can hamper normal drilling operations, and they are able to break and help deflect ice away from a blowout situation. By keeping the open water upstream of the blowout relatively free of heavy ice incursions, oil is exposed and made available for combustion and for limited recovery with spot-removal techniques further downstream.	
	As freeze-up continues and blowing snow begins to accumulate on young ice, it becomes impossible to operate the physical containment and recovery systems safely and effectively. Small work boats and barges and the 47-ft skimmer are loaded onto the larger OSRV/OSRB. ACS boats return to	

TABLE 1-18 (CONTINUED)
RESPONSE STRATEGY
SUB-SEA WELL BLOWOUT IN VARYING ICE CONDITIONS

ADEC REQUIREMENT	RESPONSE STRATEGY	APPLICABLE ACS *TECHNICAL MANUAL* TACTIC
	Prudhoe Bay. At this point, the response shifts to a concentrated effort to break and deflect ice forward of the blowout to keep oil and gas exposed as it surfaces, in order to support combustion. A Heli-torch and/or hand-held igniters will be used to re-ignite vapors if flames become extinguished. Further downstream, there will be a concentration of oil and burn residue that escapes the blowout. It is expected that this oil will be confined to a relatively narrow swath created by the natural containment of the surrounding ice. To the extent that the oil accumulates within the broken ice, every effort will be made to ignite the oil with aerial ignition techniques. It may be necessary to rely upon burning as weather, ice, and visibility permit. During the final days of the blowout, darkness and snow coverage will continue to make tracking and recovery techniques difficult, if not impossible. After the blowout stops, and all vessels have been removed from the area, the movement of the ice in the region of the blowout is monitored and recorded until it is safe to move personnel to potential areas of contamination by helicopter, all terrain vehicles (ATVs), and Rolligons (depending upon ridging, rafting, and ice stability). When safe to do so, activities on ice will focus on the detection, delineation, and marking of oiled ice and snow, as responders attempt to expose and remove oil on top of or contained within and beneath the ice. Tracking devices such as radar reflectors, stakes, and other marking systems will be left in place to guide personnel as the spring melt approaches, and when oil begins to migrate to the surface and accumulate in melt pools. Again, as with freeze-up conditions, when the ice becomes unsafe to work on during break-up, response techniques will shift to aerial ignition of oil in melt pools, and accumulations in open leads and polynyas. Throughout the first two weeks of October, personnel, work boats, equipment, and supplies are moved to shoreline cleanup sites and nearshore recovery areas possibly from Kaktovik and from other staging sites set up at key locations along the shoreline. These sites will also serve as decontamination facilities until all nearshore and shoreline response operations are shut down. Decontamination for all offshore personnel is staged on the OSRV/OSRB.	
(vii) Spill Recovery Procedures	ACS has the capabilities of mounting an effective nearshore and shoreline response program within the first 24 hours of a call-out. ACS, together with the Village Response Team personnel, will also be available to supplement the primary offshore response operations, as needed. Task Force 1: Primary response is provided by personnel and equipment located on the OSRV. This equipment includes an OSRV with a 12,000-bbl storage capacity, two large brush skimmers; two 34-foot work boats; and containment and fire boom. Task Force 2: The second oil spill response platform and its response team are mobilized from an alternate drill site located within 120 nm. The equipment with the second oil spill response platform includes the OSRB with greater than 16,000-bbl storage capacity, two large brush skimmers, four 34-foot work boats, one 47-foot skimming vessel, and containment and fire boom. Task Force 2 arrives at the location of the blowout in not more than 24 hours. Task Force 3: An Arctic tanker is centrally located between the two drilling locations (not more than 60 nm from either drilling vessel during critical drilling operations) and begins to deploy immediately, arriving in the immediate vicinity of the blowout within 16 hours. Within 1 hour, Task Force 1 initiates recovery of oil in the open water west of	R-20

TABLE 1-18 (CONTINUED)
RESPONSE STRATEGY
SUB-SEA WELL BLOWOUT IN VARYING ICE CONDITIONS

ADEC REQUIREMENT	RESPONSE STRATEGY	APPLICABLE ACS *TECHNICAL MANUAL* TACTIC
	the drilling vessel, which is located northwest of Barter Island. Two work boats tow boom in a large, U-shaped configuration with an open apex that allows oil to filter through to an OSRV immediately downstream of the apex of the boom. The open-apex booming allows for the deflection of small amounts of ice that begin to form during the early states of freeze-up. By Day 2, Task Forces 2 and 3 assist Task Force 1 in open water recovery operations. Decanting follows FOSC plan approval. Clean-up in open water continues through Day 8. Open water conditions persist through the first week of October. Depending on wind and sea conditions, young ice begins to form offshore and develops into thin layers and/or pancake ice, gradually becoming isolated from the effects of wind and wind-generated currents. Heavier ice incursions are possible with the presence of northerly winds. Through the second week, open-water recovery is hampered by increasing ice and slush, forcing the cessation of large-swath, open-apex booming. Increasing ice concentrations, together with increasing darkness, soon reduce all skimming to the spot-removal of oil pockets in broken ice. Ice breakers and burning at the spill site enhance the elimination of oil at the source, and limited physical removal continues until the end of the second week. Shortly after that, nearly all offshore response is conducted without support from skimming vessels, leaving aerial ignition of isolated patches downstream of the blowout and combustion of oil and gas at the source as the only response mode, until it is safe to operate on stable ice with the onset of winter.	
(viii) Lightering Procedures	Lightering crews offload oily waste from the OSRV/OSRB to the tanker. With the tanker in close proximity (within a mile or two) of the recovery operations, transit times to the tanker are minimal. With the use of best-available technology for transfer operations (annular injection of water at the suction of the Archimedes-type screw pumps) aboard each oil spill response platform, the lightering of viscous oil emulsions can be accomplished in approximately 6 to 8 hours. Decanting from the oil spill response platforms is accomplished with all discharge forward of the skimmers. All decanting (including from the tanker) is performed in strict compliance with all relevant state and federal regulations.	R-28
(ix) Transfer and Storage of Recovered Oil/Water; Volume Estimating Procedure	As each OSRV nears capacity, the oil spill response platform transits to the Arctic tanker for offload, and the recovered emulsions and free water are transferred to the tanker. Stored liquids are gauged with ullage tape, manifested, and logged with the assistance of the Waste Management Team.	D-1
(x) Plans, Procedures, and Locations for Temporary Storage and Disposal	A Waste Management Plan is developed in order to (1) fill out and sign manifests, (2) measure liquid and other waste, and (3) submit a plan to ADEC for waste management. Non-liquid oily wastes are classified and disposed of according to classification. Non-oily wastes are classified and disposed of accordingly. Recovered fluids stored onboard the Arctic tanker will be disposed of outside the U.S., either at Shell Group refineries or other third party processors, in accordance with Shell environmental policy and relevant local laws and regulations (see Section 1.6.10).	D-1 through D-3
(xi) Wildlife Protection Plan	Priority areas are protected by containment booming or by land-fast ice, which creates an effective natural barrier to exclude oil from sensitive habitats. A strategy is implemented to deal with any birds and mammals that may become oiled at sea, and the ACS Wildlife Stabilization Center is made operational. Polar bear guards, security staff trained by government biologists,	C-13, C-14 W-1 W-2A, W-2B

TABLE 1-18 (CONTINUED)
RESPONSE STRATEGY
SUB-SEA WELL BLOWOUT IN VARYING ICE CONDITIONS

ADEC REQUIREMENT	RESPONSE STRATEGY	APPLICABLE ACS *TECHNICAL MANUAL* TACTIC
	are assigned to protect bears and workers.	W-5, W-6
(xii) Shoreline Cleanup Equipment	Shoreline cleanup operations are based on a plan approved by the Unified Command.	SH-1
	A shoreline assessment is conducted to understand the nature and extent of oiling. Shoreline operations are conducted if land-fast ice is not yet present. Land-fast ice provides an effective natural barrier against the shoreline.	B-5, B-6
	Surface access is temporarily limited by forming ice. As freeze up continues and ice becomes more stable, oil is burned in situ and/or trenched to direct entrapped oil to containment areas where it can be burned.	C-12
	A shoreline cleanup plan is submitted to Unified Command before break-up in the event that oiled shorelines are discovered after break up. At break up, Shoreline Cleanup Assessment Teams (SCATs) monitor the tundra and adjacent shorelines for oiling, according to the plan.	SH-1
	Based on the shoreline assessment, priorities are established for cleanup. Cleanup techniques chosen are based on shoreline type and degree of oiling.	
	Access to the Canning River Delta and shoreline with large equipment is limited. Primary delta and shoreline cleanup techniques include:	
	Burning of oily vegetation,	B-2 SH-3
	Deluge of minor to moderately oiled shoreline in the river, including those areas where heavier concentrations were manually removed, and	SH-2
	Natural recovery for those areas where residual staining may remain, but further recovery would cause more harm than good.	

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RESPONSE STRATEGY 2

FUEL TRANSFER RELEASE DURING SUMMER MONTHS

RESPONSE STRATEGY PARAMETERS

The following response strategy describes methods and equipment that could be used in response to a hypothetical diesel spill during a fuel transfer from a fuel barge to one of Shell's exploratory drilling locations during summer months.

For the purposes of the strategy, the release occurs during a fuel transfer from a barge or supply boat to the drill ship, *Frontier Discoverer*. Assumptions for the discharge are based on 33 CFR 154.1029(b). The diesel release is assumed to occur due to transfer hose failure. The spill duration is assumed to be 5.5 minutes, resulting in the release of 2,000 gallons (48 bbls) of diesel. Approximately 10% of the spill is contained on the deck of the drill ship, and 90 percent of the spilled diesel enters the water. The maximum targeted recovery volume is 3,132 gallons (75 bbls). This volume includes a 1.54% emulsion rate and a free water recovery of 20% of the original spill volume.

The direction of the wind and ocean current will have limited effect to the recovery of diesel because containment boom will be pre-deployed prior to the fuel transfer. The current is assumed to be 0.75 knots to the west-northwest. The sea conditions are assumed to be typical 1½ to 2 feet wave height.

TABLE 1-19
FUEL TRANSFER RELEASE DURING SUMMER
RESPONSE STRATEGY

ADEC REQUIREMENT	RESPONSE STRATEGY	ACS *TECHNICAL MANUAL* TACTIC
(i) Stopping Discharge at Source	The fuel barge is positioned adjacent to the drill ship to conduct a fuel transfer. The fuel transfer is monitored by a dedicated response team equipped with an OSRV and two Kvichak workboats. A pre-transfer conference is conducted between the fuel vessel, the drill ship, and response team personnel. During the transfer, the fuel vessel operator, an officer in the wheelhouse of the fuel barge tug, and the hosewatch from the drill ship remain in both visual and radio contact. Additionally, the response team pre-deploys containment boom down current of the fueling operation. During the fuel transfer, the fuel hose close to the deck rail of the drill ship fails. The failure is assumed to be a complete rupture of the hose. For the purposes of the strategy, the hosewatch discovers the hose failure after 5 minutes. The hosewatch activates the emergency shutdown, stopping the pump on the fuel barge. At T=5.5 minutes, fuel transfer has stopped. The On-Site Shell Drill Foreman assumes role of Incident Commander. He activates the drill ship response team. The response team from the drill ship lifts a section of hose onto the deck, attempting to prevent any further draining of fuel. The end of the hose is sealed. Notifications to appropriate state and federal agencies are performed. ACS (in Prudhoe Bay) is put on stand-by.	Appendix C of this plan Table 1-1, Section 1 of this plan A-1, A-2
(ii) Preventing or Controlling Fire Hazards	Throughout the first few minutes of the spill, the Site Safety Officer verifies that all sources of ignition are shut down or removed from the area. The Site Safety Officer also reminds personnel that the vessel diagram has the location of all fire suppression equipment. The Site Safety Officer then provides access zone information and determines PPE requirements. Monitoring protocol is established for all work areas to ensure personnel protection. The monitoring protocol establishes safety zones according to applicable OSHA and fire hazard standards.	S-1 through S-6
(iii) Well Control Plan	Not applicable.	
(iv) Surveillance and Tracking of Oil	Diesel movement is tracked using visual observations from the drill ship, fuel barge, and support vessels. After recovery operations, one of the two Kvichak workboats performs reconnaissance of the area downcurrent of the release. If necessary, the Kuparuk Twin Otter with forward looking infrared radar (FLIR) or alternative aircraft with Synthetic Aperture Radar (SAR) is put on stand-by.	
(v) Protection of Environmentally Sensitive Areas and Areas of Public Concern	A shoreline assessment/recovery plan is not activated, because reconnaissance indicates the diesel is recovered in open water. If necessary, NOAA Environmental Sensitivity Index Maps, ACS Atlas Maps, and the North Slope Subarea Contingency Plan are used to identify areas of major concern. Nearby priority protection sites are identified. ACS is put on standby to deploy exclusion booms at the nearest shoreline.	NOAA Environmental Sensitivity Index Maps ESI 3-5 Map Atlas Sheets 80, 83-86, 88-89, 98-100 http://www.asgdc.state.ak.us/maps/cplans/subareas.html#northslope
(vi and vii) Spill Containment,	**Task Force (TF) Descriptions:** **TF-1:** Primary response is provided by personnel and equipment stationed with the	

TABLE 1-19 (CONTINUED)
FUEL TRANSFER RELEASE DURING SUMMER
RESPONSE STRATEGY

ADEC REQUIREMENT	RESPONSE STRATEGY	ACS *TECHNICAL MANUAL* TACTIC
Control, and Recovery Procedures	drill rig. This equipment includes an OSRV with 12,000 bbl storage capacity and two Lamor brush skimmers; two 34-foot Kvichak workboats; a vertical rope mop skimmer; a mini-brush skimmer; a 100-bbl storage bladder; and containment and fire boom. **TF-2:** The second response team is put on standby and is provided by personnel and equipment stationed with the drill rig. This equipment includes an OSRB with over 16,000 bbl storage capacity; two skimmers; four 34-foot workboats; one 47-foot skimming vessel; and containment and fire boom. **TF-3:** ACS Shoreline Protection Task Forces from Prudhoe Bay is put on standby to deploy exclusion booms at priority sites. TF-3 is not mobilized because the diesel is contained at sea. The Incident Commander, Barge Captain, and Site Safety Officer communicate throughout the recovery operations. **<u>Recovery Timeline:</u>** **T= 0 Minutes.** Transfer hose ruptures. TF-1 has pre-deployed two Kvichak workboats towing boom in a U-shape formation downcurrent of the fuel transfer operations. **T= 5.5 Minutes.** Fuel transfer operations have stopped. Site Safety Officer assesses access and PPE requirements. The drill ship and fuel barge detach and separate. Recovery operations begin. Sorbants are used to clean the deck of the drill ship. **T= 20 Minutes.** The workboats position the boom to contain the spilled fuel, and then proceed to the OSRV for recovery. The OSRV utilizes either a mini-brush skimmer or rope mop to collect the contained diesel. Recovered fuel/water mixture is stored in the OSRV. **End of Day 1.** Recovery operations have stopped. Approximately 75 bbl of liquid (fuel/water) is collected and stored in the OSRV.	Section 1.6.6 and 1.6.7 of this plan
(viii) Lightering Procedures	On a non-emergency basis the recovered diesel is lightered to either a 249-bbl barge mobilized from Deadhorse by ACS or a 513,000-bbl tanker located within 60 nautical miles.	R-28
(ix) Transfer and Storage of Recovered Oil/Water; Volume Estimating Procedure	The volumes of stored oil emulsion and free water are gauged with ullage tape and recorded on waste manifests	R-28
(x) Plans, Procedures, and Locations for Temporary Storage and Disposal	A Waste Management Plan is developed in order to (1) fill out and sign manifests; (2) measure liquid and other waste; and (3) submit a plan to ADEC for waste management. Non-liquid oily wastes are classified and disposed of according to classification. Non-oily wastes are classified and disposed of accordingly. Recovered fluids potentially transferred to West Dock by ACS will be disposed of in injection wells or processing and placement into a production pipeline. In the event that recovered fluids are stored onboard the Arctic tanker, they will be disposed of outside the US, either at Shell Group refineries or other 3rd party processors, in accordance with Shell environmental policy, and relevant local laws	D-1 D-2 D-3 Section 1.6.10 of this plan

TABLE 1-19 (CONTINUED)
FUEL TRANSFER RELEASE DURING SUMMER
RESPONSE STRATEGY

ADEC REQUIREMENT	RESPONSE STRATEGY	ACS *TECHNICAL MANUAL* TACTIC
	and regulations.	
(xi) Wildlife Protection Plan	Wildlife monitoring is conducted immediately. If necessary, deterrents to protect animals are put in place at the spill scene during recovery operations. The International Bird Research and Rescue Center is put on standby in the event the wildlife treatment facility is required.	W-1 W-2, W-2B, L-6
(xii) Shoreline Cleanup Plan	Not Applicable. Fuel dissipates prior to encountering any shoreline.	

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1.7 NON-MECHANICAL RESPONSE OPTIONS [18 AAC 75.425(e)(1)(G)]

Shell will mechanically contain and clean up oil spills to the maximum extent possible. When mechanical response methods are no longer effective in situ burning will be used to augment mechanical response.

1.7.1 Obtaining Permits and Approvals

Burning will not occur without approval of federal, state, and local agencies. The Shell Incident Commander will discuss the option of in situ burning with the FOSCs and SOSCs, and an "RRT In-Situ Burn Application Form" will be prepared. This form is provided in the ACS *Technical Manual*, Tactics B-1 and B-1A. Deliberate ignition of the blowout for safety reasons, however, may be approved by the FOSC without delay if it is felt that an accidental ignition of vapors from the blowout could result in serious harm to on-site personnel and responders.

1.7.2 Decision Criteria for Use

As covered in ACS Tactic B-1, burning may be used as a spill control measure once regulatory approval has been obtained. Should burning be needed, Shell will complete the Alaska Regional Response Team Application for In-Situ Burning, and submit the application to the Unified Command (see ARRT Unified Plan, Appendix 2, Annex F, In-Situ Burning Guidelines for Alaska).

When mechanical recovery is unfeasible or ineffective, removing oil from the water by in situ burning may provide significant protection for fish, wildlife, and sensitive environments, as well as commercial, subsistence, historic, archaeological, and recreational resources.

In situ burning may:

- Prevent the resources from coming into contact with spilled oil;
- Reduce the size of the spill and thus the amount of spilled oil affecting natural resources;
- Allow the environment to recover to the pre-spill state sooner; and
- Provide the most effective means to remove oil from water prior to shoreline impacts in broken ice conditions, in remote or inaccessible areas, or when containment and storage facilities are overwhelmed.

1.7.3 Implementation Procedures

If the Shell Incident Commander decides to use in situ burning and obtains the necessary authorization, ACS and AES will carry out the response (see ACS Tactics B-1, B-1A, B-3, B-5, and B-6).

Once approved, in-situ burning will normally involve the following steps:

1. Collect and concentrate the oil using a fire-resistant boom, ice cakes/floes, ice pits, or other natural features as gathering places for the burn;

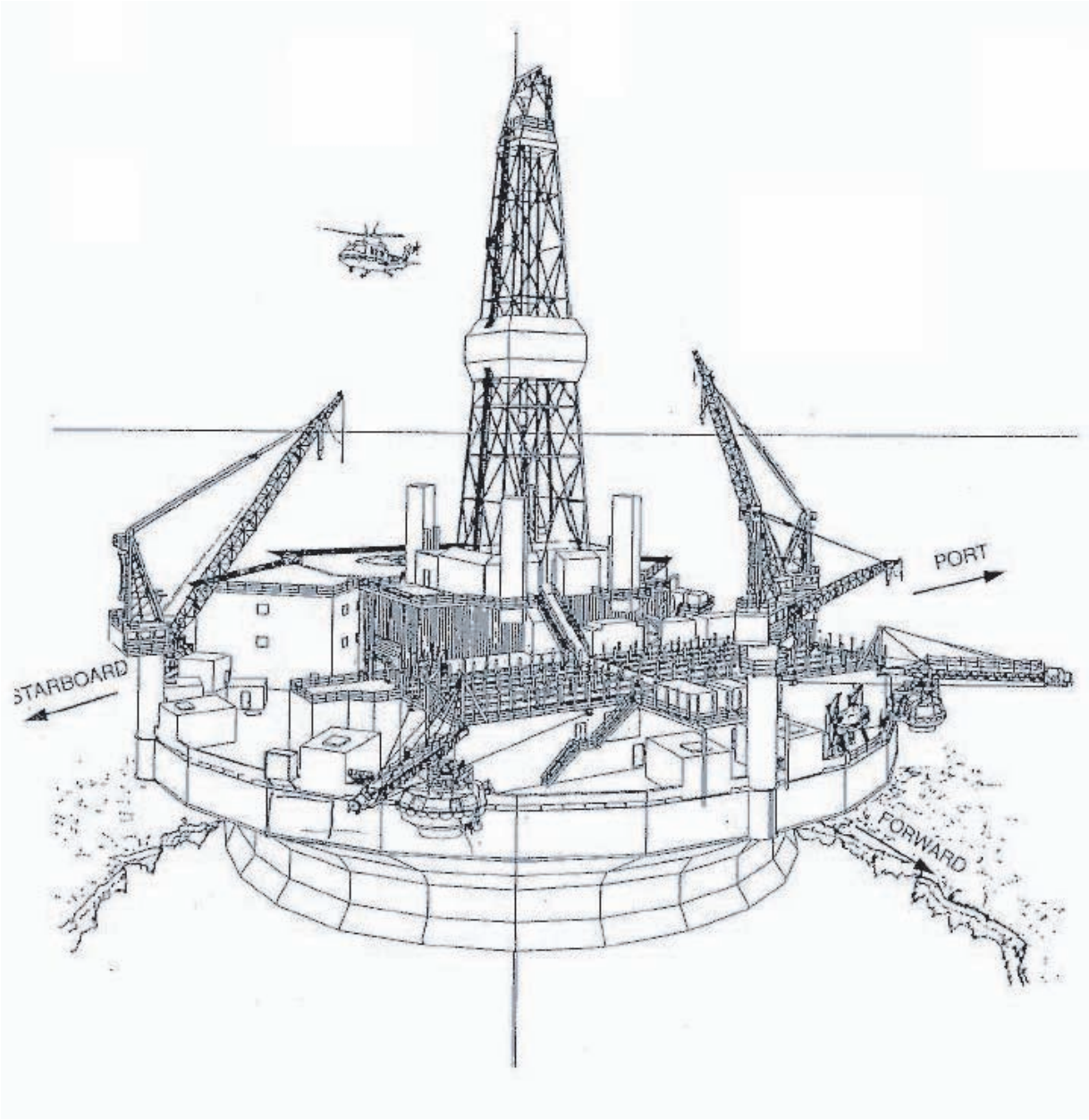
2. Ignite the oil using the Heli-Torch or hand-held igniters, making sure to avoid flashback and ignition of the spill source;

3. Monitor the burn, maintaining constant watch on the fire and smoke plume, condition of containment boom, speed and position of boom-towing vessels, and other safety hazards and issues; and

4. To the extent possible, recover and dispose of the burn residue.

1.8 FACILITY DIAGRAMS [18 AAC 75.425(e)(1)(H)]

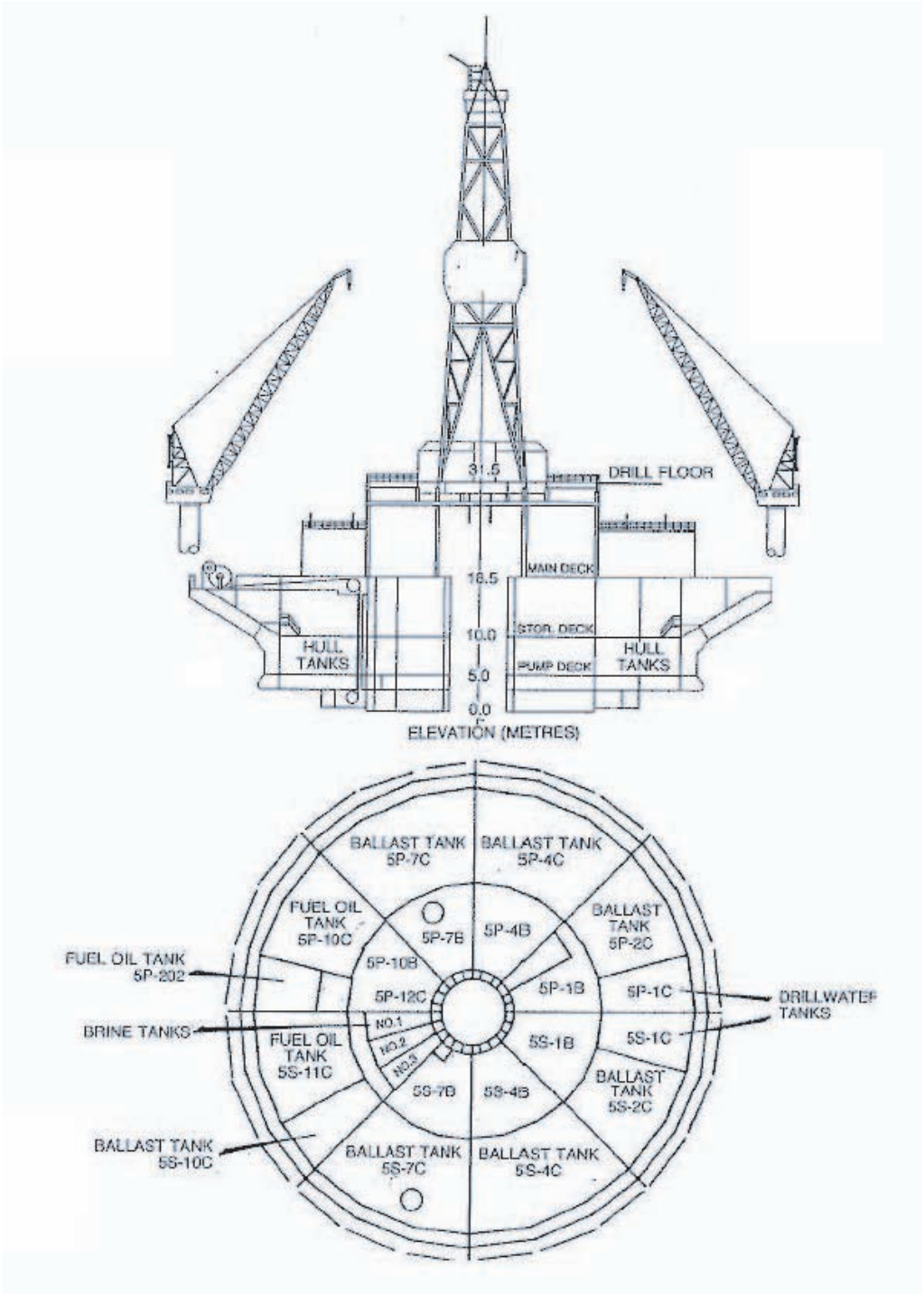
Diagrams for the drilling vessels are presented in Figures 1-13 through 1-17.



SHELL OFFSHORE, INC.

KULLUK DRILL RIG

December 2006 | Figure - 1-13



SHELL OFFSHORE, INC.

KULLUK DRILL RIG SCHEMATIC

December 2006 | Figure 1-14

PRINCIPLE DIMENSIONS

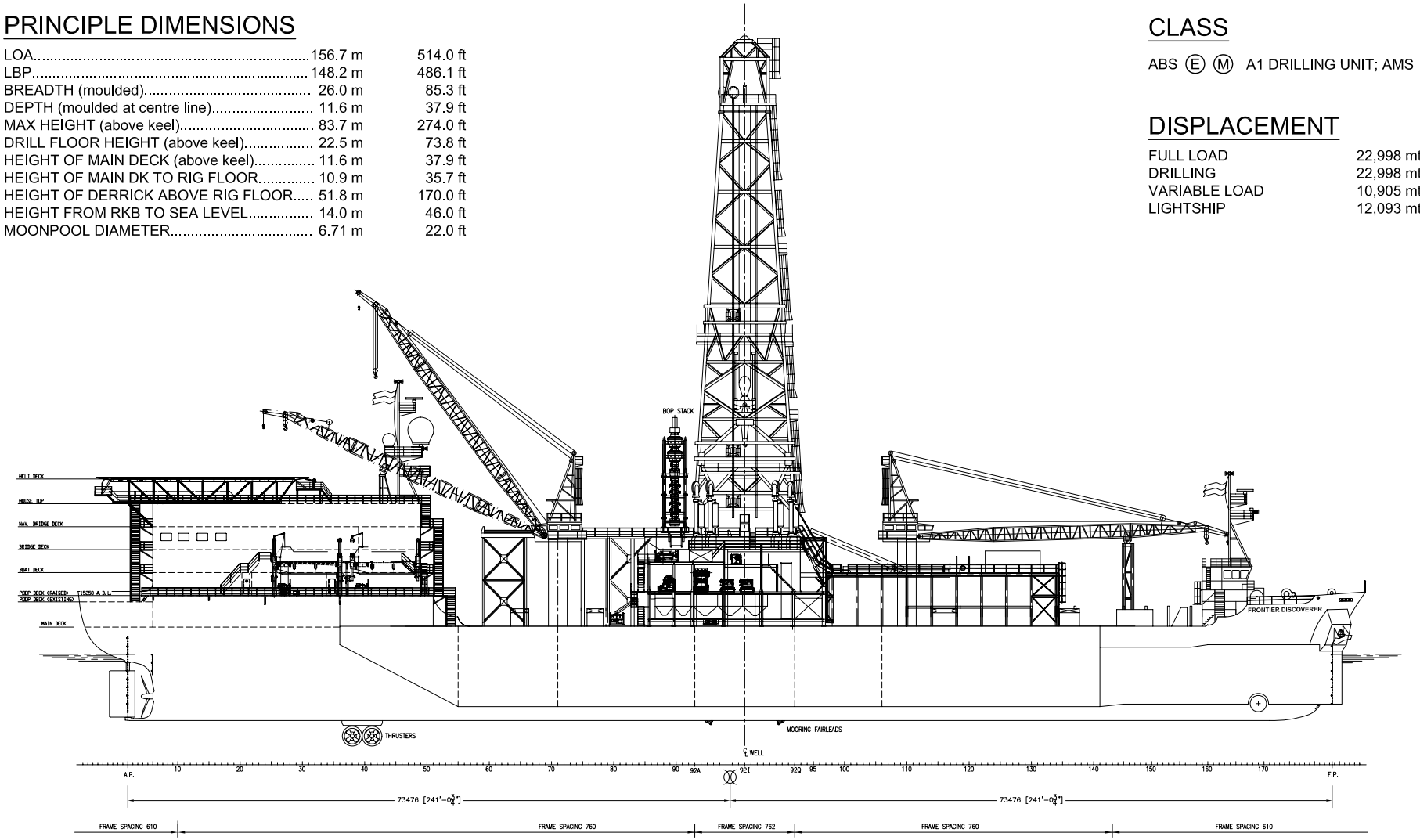
LOA	156.7 m	514.0 ft
LBP	148.2 m	486.1 ft
BREADTH (moulded)	26.0 m	85.3 ft
DEPTH (moulded at centre line)	11.6 m	37.9 ft
MAX HEIGHT (above keel)	83.7 m	274.0 ft
DRILL FLOOR HEIGHT (above keel)	22.5 m	73.8 ft
HEIGHT OF MAIN DECK (above keel)	11.6 m	37.9 ft
HEIGHT OF MAIN DK TO RIG FLOOR	10.9 m	35.7 ft
HEIGHT OF DERRICK ABOVE RIG FLOOR	51.8 m	170.0 ft
HEIGHT FROM RKB TO SEA LEVEL	14.0 m	46.0 ft
MOONPOOL DIAMETER	6.71 m	22.0 ft

CLASS

ABS Ⓔ Ⓜ A1 DRILLING UNIT; AMS

DISPLACEMENT

FULL LOAD	22,998 mt
DRILLING	22,998 mt
VARIABLE LOAD	10,905 mt
LIGHTSHIP	12,093 mt



OUTBOARD PROFILE

TONNAGES

GROSS (International)	12,230 tons
NET (International)	3,669 tons

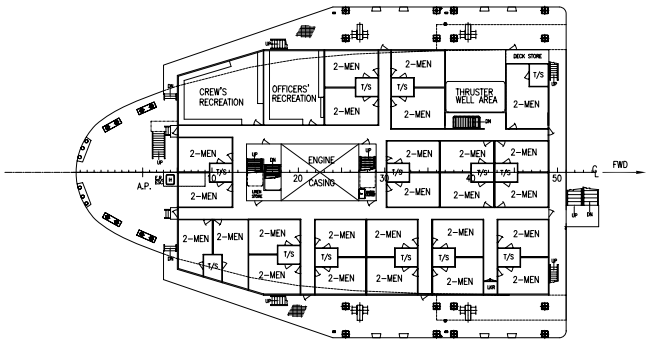
DRAUGHT

DRAFT AT LOAD LINE	8.20 m	27 ft
TRANSIT	8.20 m	
DRILLING	8.20 m	
LIGHTSHIP DRAFT (Mean)	4.75 m	(Lightship incl. perm ballast, mean)

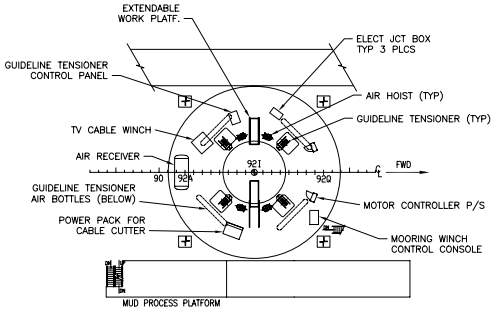
SHELL OFFSHORE, INC.

FRONTIER DISCOVERER GENERAL ARRANGEMENT OF OUTBOARD PROFILE

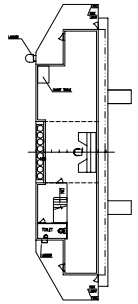
December 2006 | Figure 1-15



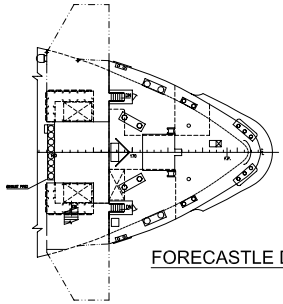
POOP DECK



MOORING PLUG ROOF

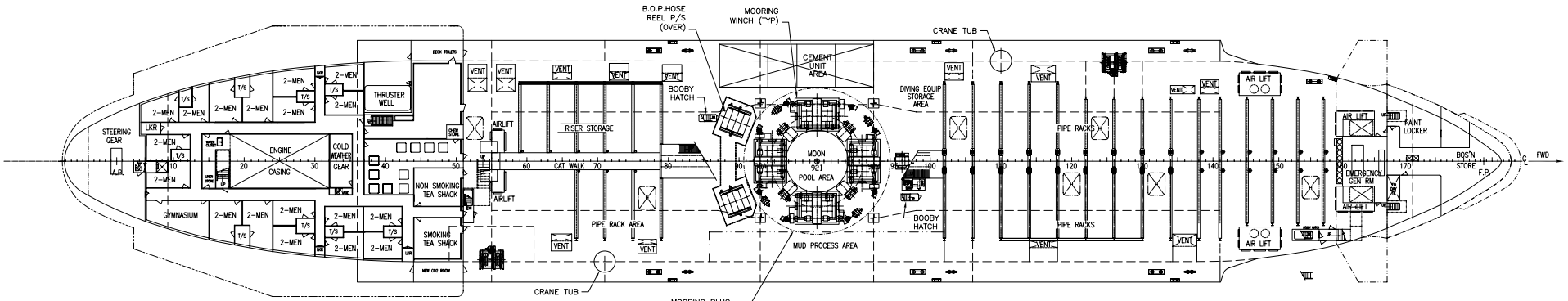


FORWARD BRIDGE



FORECASTLE DECK

LEVEL A

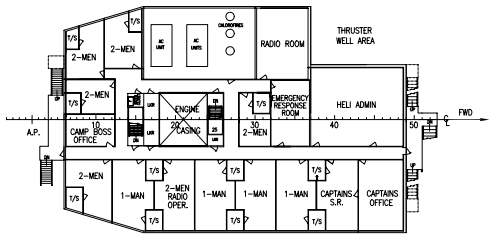


MAIN DECK

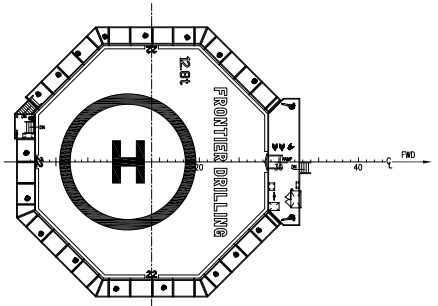
SHELL OFFSHORE, INC.

FRONTIER DISCOVERER GENERAL ARRANGEMENT OF MAIN DECK AND ABOVE

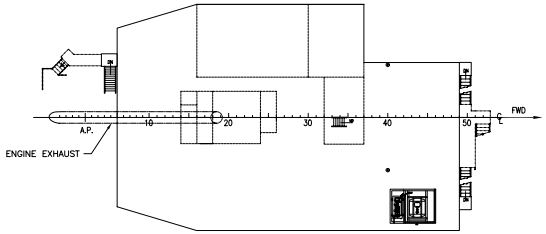
December 2006	Figure 1-16



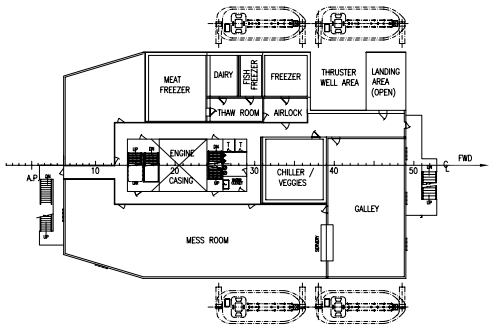
NAV. BRIDGE DECK



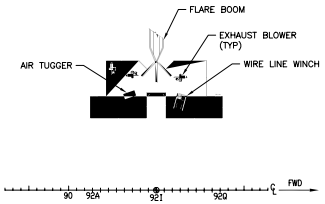
HELI DECK



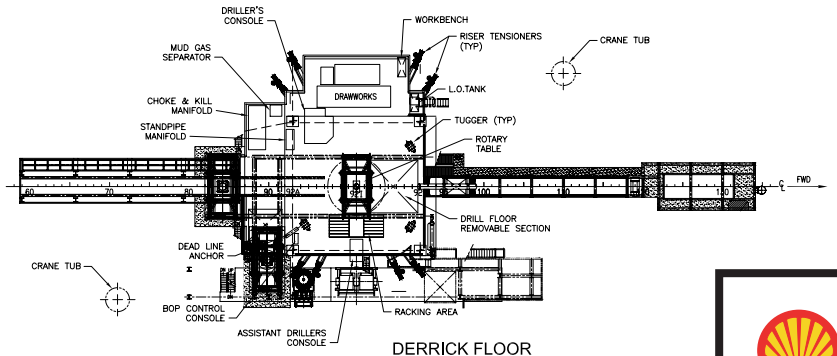
HOUSE TOP



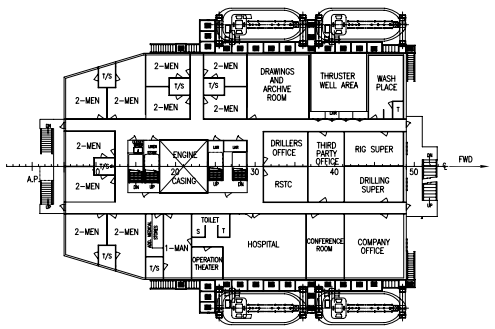
BRIDGE DECK



DRAWWORKS HOUSE ROOF



DERRICK FLOOR



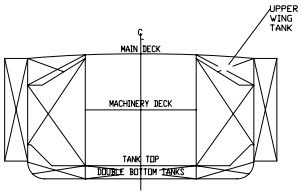
BOAT DECK

SHELL OFFSHORE, INC.

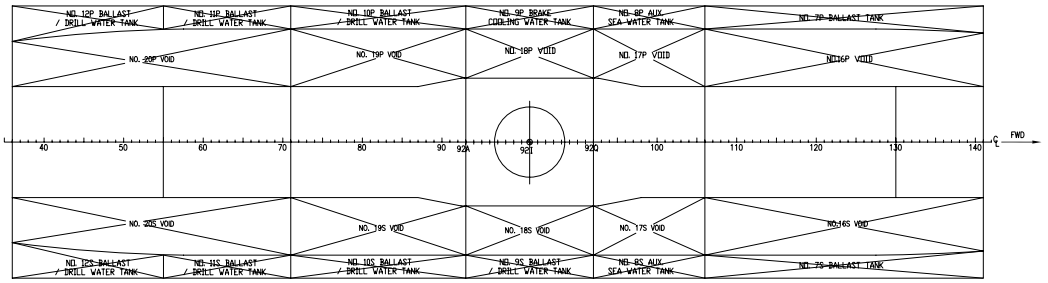
FRONTIER DISCOVERER MAIN DECK VIEW 2

December 2006

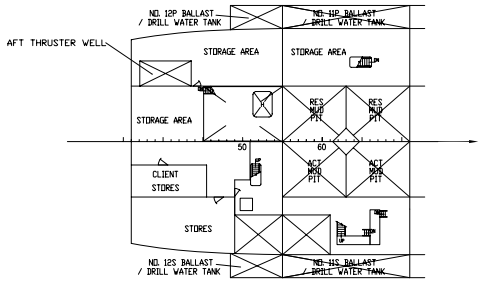
Figure 1-17



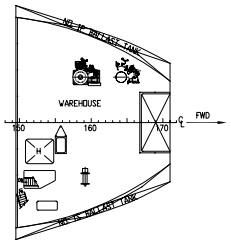
TYPICAL SECTION
TANK LAYOUT



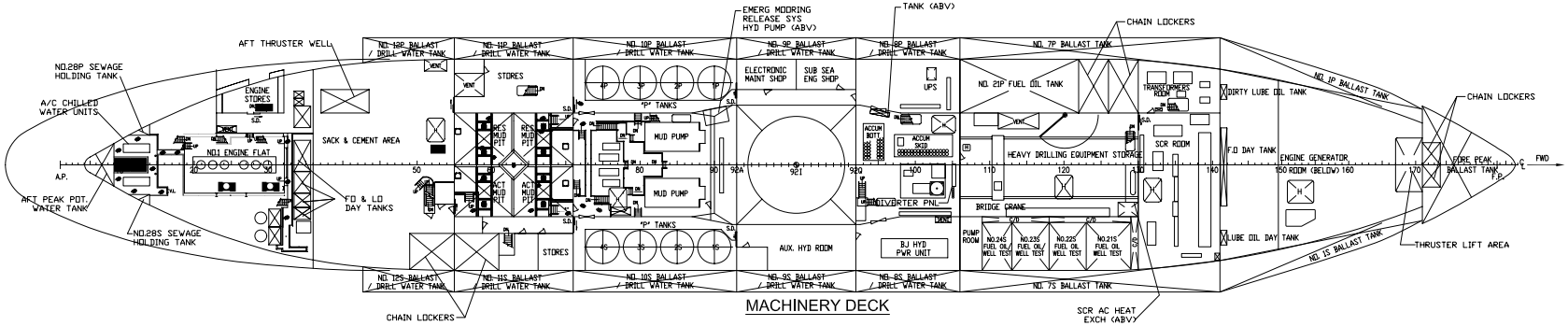
UPPER WING TANK LAYOUT



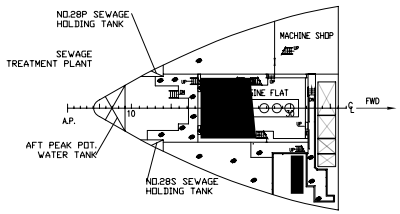
STORES MEZZANINE DECK



ENGINE GEN. ROOM
MEZZANINE DECK



MACHINERY DECK

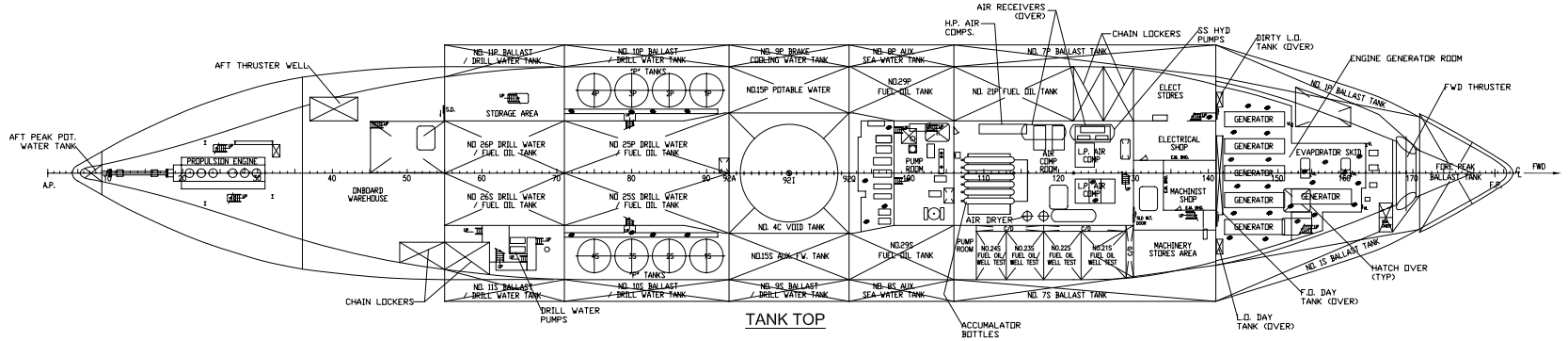


NO. 2 ENGINE FLAT

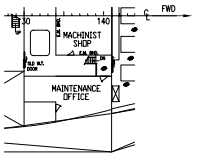
SHELL OFFSHORE, INC.

FRONTIER DISCOVERER GENERAL ARRANGEMENT OF LOWER DECKS

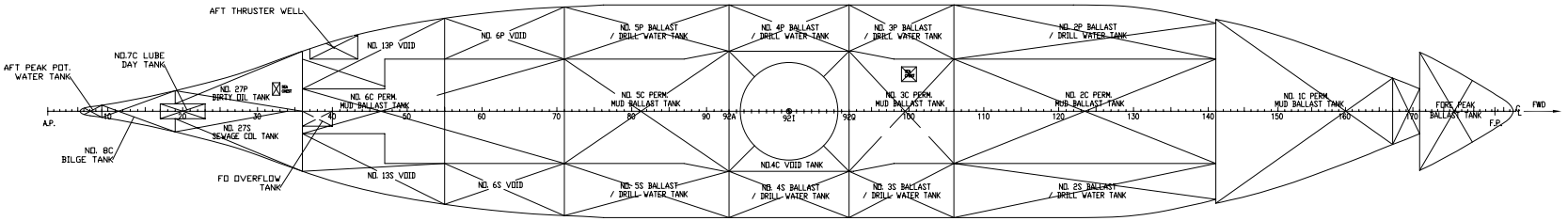
December 2006 | Figure 1-18



TANK TOP



MAINTENANCE OFFICE FLAT



DOUBLE BOTTOM

SHELL OFFSHORE, INC.

FRONTIER DISCOVERER LOWER DECKS VIEW 2

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Figure 1-19

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